

IN INDUSTRY • IN TRANSPORTATION • ON THE SEA • IN THE AIR

DIESEL PROGRESS



FIVE DOLLARS PER YEAR

JANUARY, 1954

FIFTY CENTS PER COPY

TYPICAL EXAMPLES DIESEL ENGINE

... WITH TE
URSA OI

In plants everywhere, Diesels lubricated with member of the famous *Texaco Ursa Oil* series are records for low maintenance costs and economy. For example, (names on request) —

Tulia, Texas: Has been using *Texaco Ursa Oil* for 10 years. Had a stuck ring. Wear has been very low.

Sioux Falls, South Dakota: Engine of 14 years, has generated 12.16 kwh. at the rate of 12.16 kwh. per hour.

McGregor, Iowa: Ten-year record. Hours per gallon of lube oil. Engine no measurable wear.

Weatherford, Texas: Yearly inspection. Wear less than .001" per thousand. Original rings still in place.

The *Texaco Ursa Oil* series is a complete line of Diesel lubricating oils especially refined to make Diesel, gas and dual-fuel engines give more power with less fuel over longer periods between overhauls. That is why —

For more than twenty years, more stationary Diesel horsepower in the United States has been lubricated with Texaco than with any other brand.

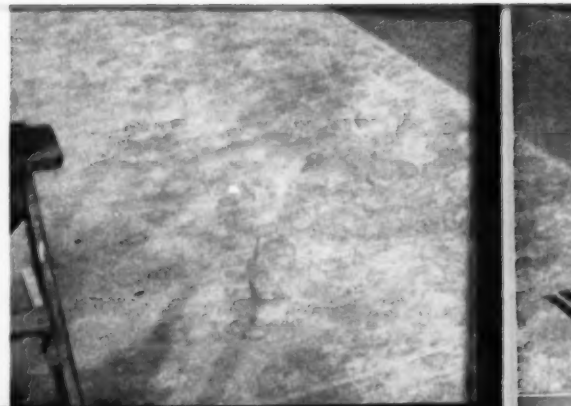
Let a Texaco Lubrication Engineer help you. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TUNE IN:
METROPOLITAN OPERA
radio broadcasts
every Saturday afternoon.
See newspaper for
time and station.



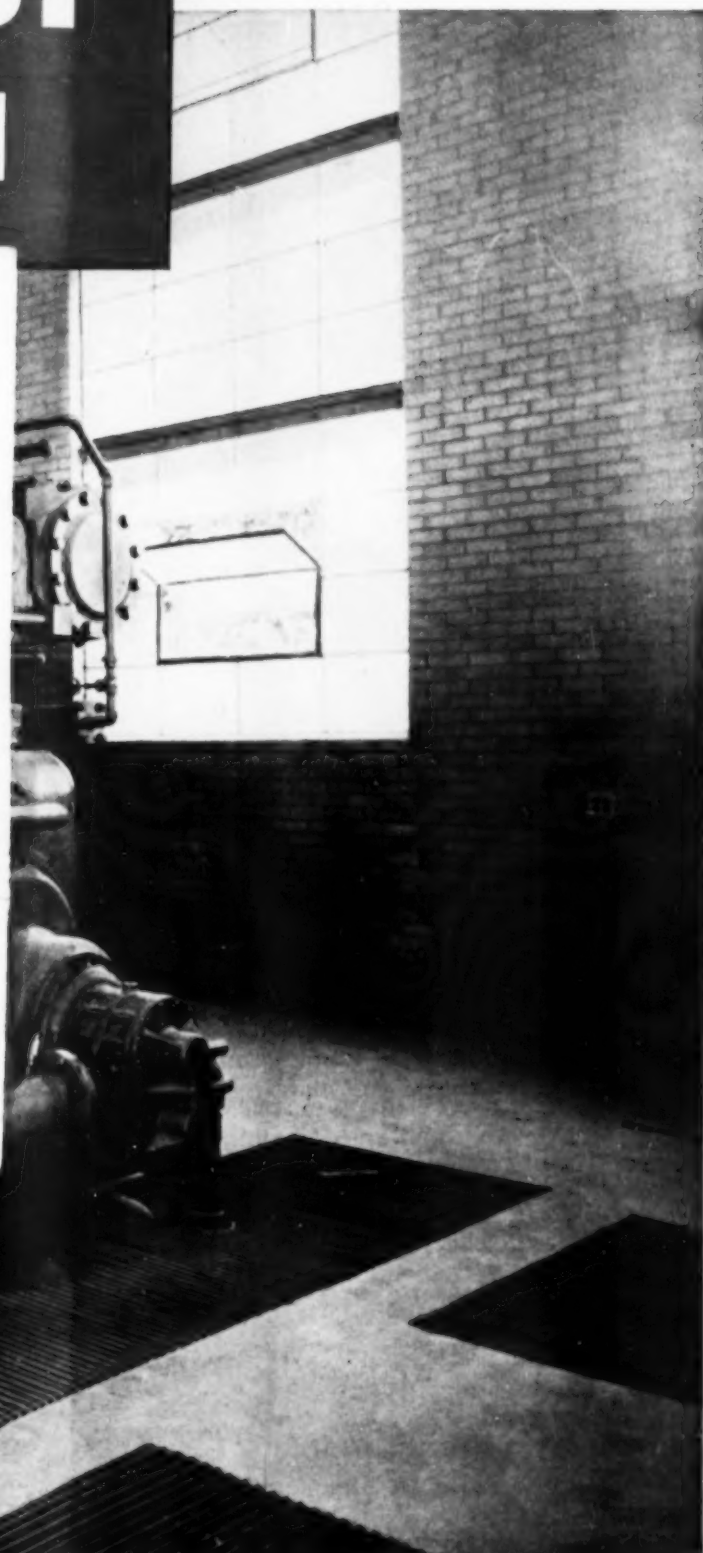
TEXACO

WAV PAG



**S OF LOW COST
E OPERATION**

**NAVY
ENGINES**



URSA OILS

**FOR ALL DIESEL, GAS
AND DUAL-FUEL ENGINES**

TYPICAL EXAMPLES DIESEL ENGINE

... WITH TEXACO URSA OILS

In plants everywhere, Diesels lubricated with the recommended member of the famous *Texaco Ursa Oil* series are turning in outstanding records for low maintenance costs and economical fuel consumption. For example, (names on request) —

Tulia, Texas: Has been using *Texaco* for 20 years, never had a stuck ring. Wear has been slight, maintenance costs very low.

Sioux Falls, South Dakota: Engine in service 96 per cent of time for 14 years, has generated over 71 million kwh. at the rate of 12.16 kwh. per gallon of fuel consumed.

McGregor, Iowa: Ten-year records show 12,469 h.p. hours per gallon of lube oil. Engines stay clean, with no measurable wear.

Weatherford, Texas: Yearly inspections show cylinder wear less than .001" per thousand hours, no detectable bearing wear. Original rings still in use.

The *Texaco Ursa Oil* series is a complete line of Diesel lubricating oils especially refined to make Diesel, gas and dual-fuel engines give more power with less fuel over longer periods between overhauls. That is why —

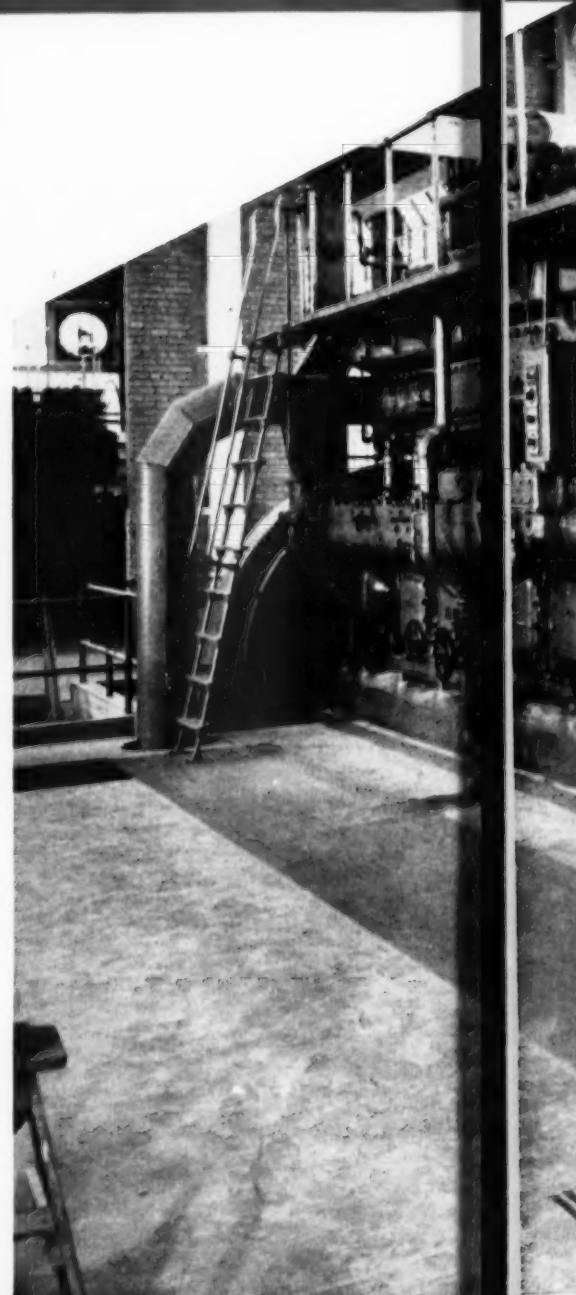
For more than twenty years, more stationary Diesel horsepower in the United States has been lubricated with Texaco than with any other brand.

Let a *Texaco* Lubrication Engineer help you. Just call the nearest of the more than 2,000 *Texaco* Distributing Plants in the 48 States, or write The *Texaco* Company, 135 East 42nd Street, New York 17, N. Y.

TUNE IN:
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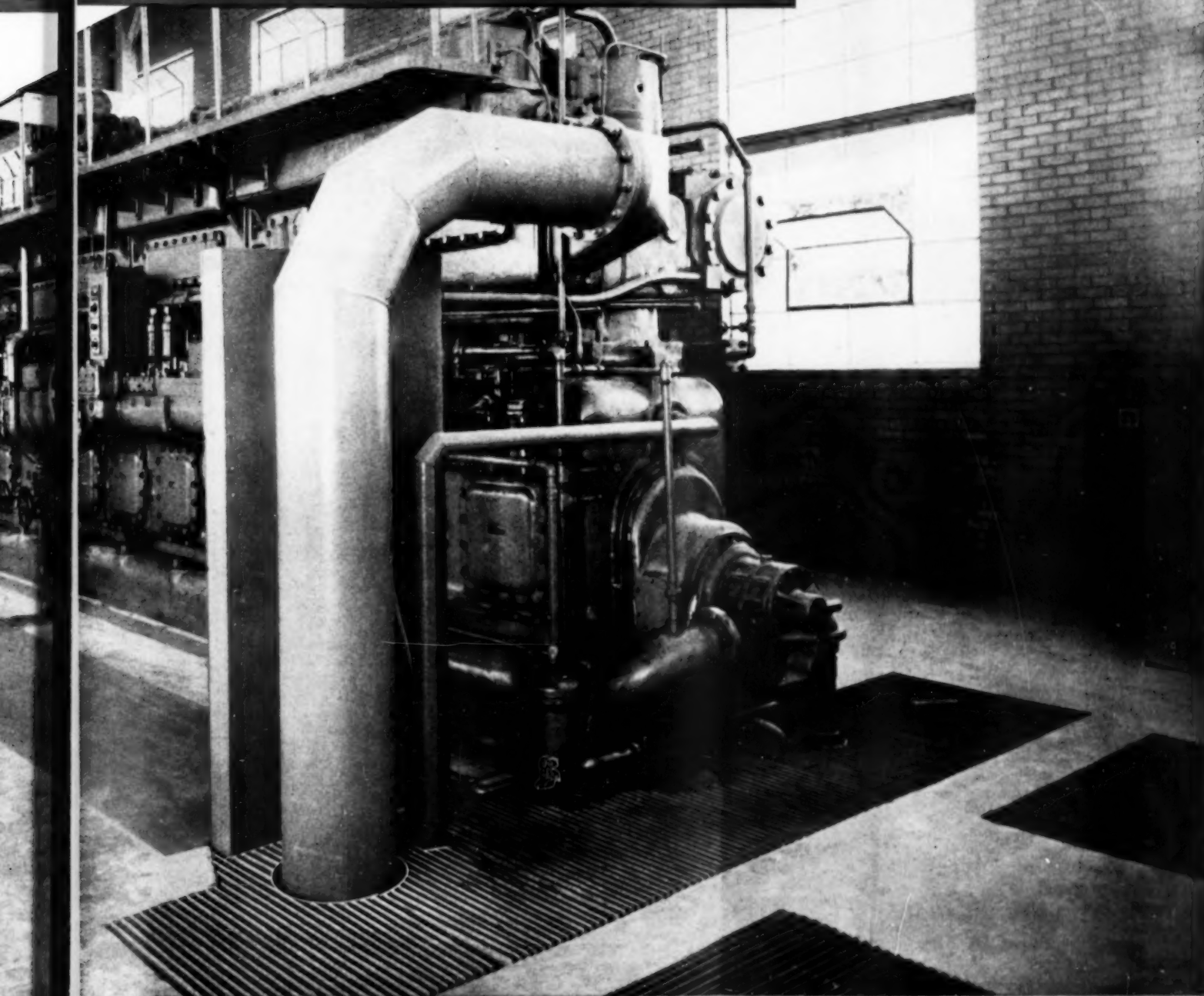


TEXACO



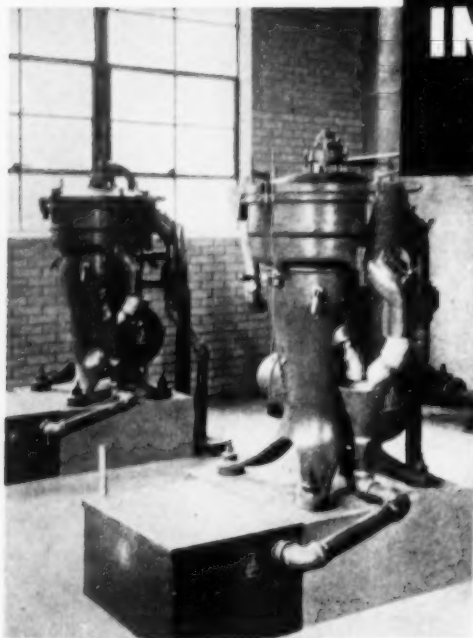
S
E

OF LOW COST OPERATION



D

URSA OILS FOR ALL DIESEL, GAS
AND DUAL-FUEL ENGINES



INTERESTED IN BURNING HEAVY FUEL?

**De Laval Oil Purifiers
Will Prepare the Oil for
Combustion More Adequately
than Any Other Means**

De Laval Oil Purifiers are the most effective means in existence for preparing residual fuel for burning. These centrifuges remove a maximum amount of incombustible solids from heavy residual fuel.

The De Laval Oil Purifiers operate at constant efficiency. That means that the bowl removes dirt at a constant rate, from the moment it starts until it is completely full of dirt. Dirt is stored outside of the zone where purification takes place . . . the effective working bowl diameter is not decreased during operation.

In one specific instance, a De Laval bowl removed from 13 to 15 pounds of dirt in 5 hours before cleaning was necessary!

Write for the whole story . . .



DeLaval

THE DE LAVAL SEPARATOR COMPANY
Chicago POUGHKEEPSIE, N.Y. San Francisco

**for most dependable
power production**

FUEL OIL PURIFIERS

ARIZONA

Phoenix, Charlie C. Jones Battery & Elec. Co.,
300-322 West Jefferson St.

CALIFORNIA

Los Angeles 21, Magneto Sales & Service Co.,
751 Towne Avenue
Sacramento, Langner & Rifkin, 1116 15th St.
San Diego 1, Elec. & Diesel Service Co., 1254
Kettner Blvd.
San Francisco 3, Furrer & Uster, Inc., 225-7th St.
San Francisco 3, H. G. Makelim Magneto Repair
Co., 1583 Howard Street
Wilmington, Diesel Control Corporation, 218
North Marine Ave.

COLORADO

Denver 3, Central Supply Co., 1171 Lincoln Street

FLORIDA

Jacksonville 1, Spencer Electric Co., Inc., 40 West
Beaver Street
Miami 36, Florida Diesel Service Co., 1930 North
Miami Ave.

GEORGIA

Atlanta 3, Auto Electric & Magneto Co., 477
Spring Street, N. W.

ILLINOIS

Chicago 16, Illinois Auto Electric Co., 2011-37
Indiana Ave.
Rock Island, Lohse Automotive Service, Inc., 430
North Capital Ave.

MISSOURI

Kansas City 8, Electrical & Magneto Service, Inc.,
2538 Grand Avenue
St. Louis 23, Diesel Fuel Injection Service Co.,
9331 South Broadway

NEBRASKA

Omaha 2, Carl A. Anderson, Inc., 16th and Jones St.

NEW JERSEY

Newark 2, Tire Trading Co., 239 Halsey Street

NEW YORK

Brooklyn 32, A&D Diesel Service, Inc., 145-21st St.
Brooklyn 16, E. A. Wildermuth, Inc., 1102 Atlantic
Avenue
Buffalo 8, Hettrich Electric Service, 1032 Ellicott St.
Syracuse 4, F. A. Crossman, Inc., 943 Genesee St.
Troy, Ehrlich Electric Service, Inc., 200 Fourth St.

NORTH CAROLINA

Raleigh, Diesel Injection Service, 3015 Hillsboro
Road

DIRECTORY OF SERVICE STATIONS IN U.S.A.

TEXAS

Corpus Christi, Womack Bros., 1302 Caldwell
Dallas, Beard & Stone Electric Co., 3909 Live
Oak Street
El Paso, Reynolds Battery & Magneto Co., 801
Myrtle Ave.
Houston 1, Beard & Stone Electric Co., Milam at
Polk Street
Houston 11, Magneto & Diesel Injector Service,
6931 Navigation Blvd.
Odessa, Electric Service & Supply, 1601 North
Grant Street
San Antonio, Womack Bros., 123 West Carolina

UTAH

Salt Lake City 2, Diesel Electric Service & Supply
Co., 58 East 7th, South

VIRGINIA

Norfolk, Diesel Injection Sales & Service, 808
Union Street
Richmond 20, Charles H. Woodward Electric Co.,
709 Broad Street
Salem, Diesel Injection Sales & Service, 814-8th
Street

WASHINGTON

Seattle 1, Seattle Injector Co., 2706 Second Ave.
Seattle 14, Sunset Electric Co., 300 Westlake,
North
Spokane 8, Sunset Electric Co., North 703
Division Street



A NATION-WIDE *Authorized* SERVICE ORGANIZATION

Bendix

FUEL INJECTION EQUIPMENT

INDIANA

Indianapolis, Gulling Auto Electric, Inc., 450
North Capital Ave.

IOWA

Cedar Rapids, Edwards Carburetor & Electric
Co., 209 Seventh St., S. E.
Des Moines 9, Electrical Service & Sales Co.,
1313 Walnut Street

KENTUCKY

Louisville, Ellingsworth Auto Electric Co., 1003
East Broadway

LOUISIANA

New Orleans 13, John M. Walton, Inc., 1050
Carondelet Street
Bossier City, Vaughan Tractor & Auto Parts Co.,
605 West Street
Mail Address: P.O. Box 661, Shreveport, La.

MARYLAND

Baltimore 1, Parks & Hull Automotive Corp., 1033
Cathedral Street

MASSACHUSETTS

Newton Upper Falls, W. J. Connell Co., 210
Needham St., Newton Industrial Center

MICHIGAN

Detroit 2, Knorr-Maynard, Inc., 5743 Woodward
Ave.

MINNESOTA

Minneapolis 6, Diesel Service Co., 2509 East
Lake Street
Minneapolis 2, Reinhard Bros. Co., Inc., 11 South
9th Street

OHIO

Cleveland 14, Cleveland Ignition Co., 1301
Superior Ave., N. E.

OKLAHOMA

Tulsa 3, Magneto Ignition Co., 701 West 5th St.

OREGON

Portland 14, Automotive Products, Inc., 1700
Southeast Grand Ave.

PENNSYLVANIA

Hazleton, Penn Diesel Service Co., No. Church at
27th St.
Philadelphia 32, J. W. Parkin, Jr., 2251 North
Broad Street
Pittsburgh 13, Automotive Ignition Co., 6358
Penn Avenue

TENNESSEE

Memphis 4, Automotive Electric Service Co.,
982 Linden Ave.

WISCONSIN

Milwaukee 2, Wisconsin Magneto Co., 918 North
Broadway

Canada**ALBERTA**

Calgary, Hutton's, Ltd., 131-11th Avenue, West

BRITISH COLUMBIA

Vancouver, Magneto Sales & Service, Ltd., 126
Gore Avenue

NEWFOUNDLAND

St. John's, A. H. Murray & Co., Ltd.

QUEBEC

Montreal, International Electric Co., 1037 Bleury
Street

Alaska**ALASKA, TERRITORY OF**

Anchorage, Reeve Alaska Automotive, Merrill Field,
P.O. Box 1160

SCINTILLA DIVISION of SIDNEY, NEW YORK

Bendix

AVIATION CORPORATION

Western Offices: 582 Market Street, San Francisco 4, California • Export Sales: Bendix International Division, 205 East 42nd Street, New York 17, N.Y.



5

SINCE '50 FOR ESSO

"Esso Tug No. 20" is the fifth General Motors Diesel-Electric powered tug to join the Esso Standard Oil Company fleet since 1950. With her sisters, Esso Tugs Nos. 9, 10, 11 and 12, she's now docking tankers and towing oil barges in and around New York harbor.

All Esso Standard tugs are GM Diesel-Electric powered. In more than three years' service these GM Diesels have proved their dependability and low-cost operation.

CLEVELAND DIESEL ENGINE DIVISION

GENERAL MOTORS • CLEVELAND 11, OHIO



Tie Up to GM Service

ENGINES FROM 150 TO 3250 H.P.



Sales and Service Offices: Cambridge, Mass. • Chicago, Ill. • Miami, Fla. • New Orleans, La. • New York, N. Y. • Norfolk, Va. • Orange, Texas • San Francisco, Calif. • Seattle, Wash. • St. Louis, Mo. • Toronto, Ont. • Vancouver, B. C. • Washington, D. C. • Wilmington, Calif.

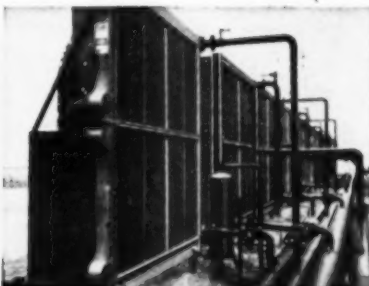
Use Them Individually or in Combination...

YOUNG HEAT TRANSFER PRODUCTS
Are ALL Engineered to Work Together



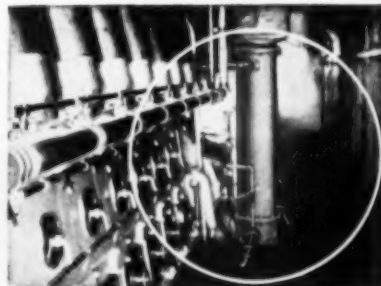
**"Mono-Weld"
Jacket Water Coolers**

Rugged, welded-steel construction assures maximum strength with minimum weight for stationary or semi-portable equipment. Core sections readily replaceable. Tanks easily removed for cleaning.



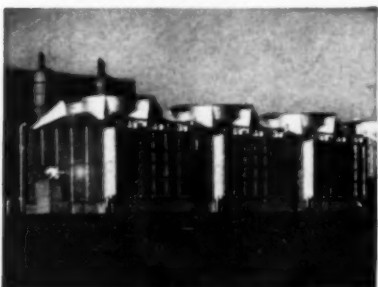
**"Full-Flow"
Jacket Water Coolers**

Sturdy, welded-steel frame with specially-designed Young "Full-Flow" cast tanks. Flexible mountings absorb vibration, allow for expansion and contraction. Tanks easily removed for cleaning.



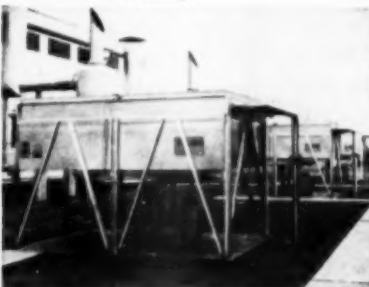
**Shell and Tube
Heat Exchangers**

Available in 690 standard models, single to four-pass, fixed and removable tube bundles. Unusually close-tolerance construction assures maximum cooling with minimum weight. Calculator available.



**"VAD" Cooling and
Condensing Units**

Vertical air discharge permits compact multiple unit installations without loss of efficiency due to cross winds. Low-level mounting, low-cost installation, easy inspection and maintenance are features.



**Standard "HC" Cooling and
Condensing Units**

Horizontal core construction with vertical air discharge. Rugged structural design; wide choice of cores; complete with fans, power plants and controls. In single or multiple type units.

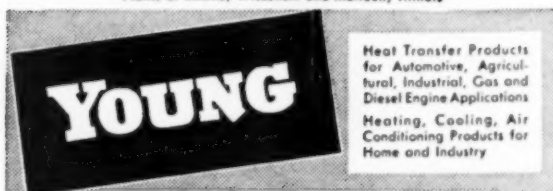


**Special "HC" Cooling
and Condensing Units**

Specially designed, space-saving units, or extra-large capacity cooling and condensing units can be made to exact specifications. Includes standard equipment; accessories, optional.

YOUNG RADIATOR COMPANY

Dept. 404 A, Racine, Wisconsin
Plants at Racine, Wisconsin and Matteson, Illinois



Leaders in Heat Transfer Engineering for more than 25 years

For a full picture of the complete Young Line of heat transfer equipment, write for a free copy of General Catalog No. 148. For more detailed information on any of the products shown above, please state which products interest you most, and a complete catalog will be sent without obligation.



**"DUST
DOCTORS"**

to Industry

**CYCOIL OIL BATH
AIR CLEANERS GUARD
HEALTH — PROLONG LIFE of
ENGINES and COMPRESSORS**

Dust damage, resulting in costly shutdowns and repairs, was once accepted as an occupational disease among engines and compressors. Today, "down time" traceable to such damage is an exception rather than the rule.

The reason—Cycoil, the "dust doctor", is on the job practicing true preventive medicine. Designed to operate at 100% efficiency, this air cleaner traps over 90% of the fine-dust content of the air before it even reaches the filter pads. Thus, with added filtration of the dual filter pads, plus positive oil circulation for continuous self-cleaning action, your final result is approximately 100% clean air.

Yes, Cycoil's high efficiency means healthy engines and compressors—along with healthy savings. Write for Bulletin No. 130. It gives you the complete Cycoil story right down to the last bolt and nut.



American Air Filter
COMPANY, INC.

408 Central Avenue, Louisville 8, Kentucky • American Air Filter of Canada, Ltd., Montreal, P. Q.

The Engineer's Report

CASE HISTORY

Chevron Starting Fluid
PRODUCT

Young Truck Lines,
FIRM *Salt Lake City, Utah*

Starting fluid saves 1152 man-hours per winter!



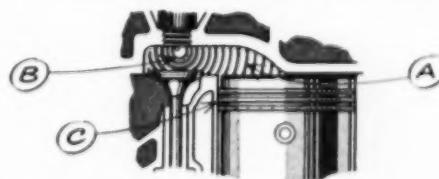
A LITTLE CHEVRON STARTING FLUID, injected into the intake on the diesel engine of this truck, starts it instantly in temperatures far below zero. The fast starts eliminate delays that amounted to at least 16 hours per week on each of 6 trucks like this operated by Harry L. Young and Sons, Inc., Salt Lake City. Used for hauling mining machinery in the mountain states, these trucks often must be parked outside over night where it is extremely cold. Chevron Starting Fluid starts them anywhere they go without the aid of booster batteries. It is available in 1-pint cans, and in 7- and 17-cc capsules. In 9.9-cc pressure primer steel bulbs, ask for Chevron Priming Fuel. Your fluid supplier also has special primer equipment.

FREE FOLDER tells you more about Chevron Starting Fluid and where to apply it on different engines. Write or ask for it today.

FOR MORE INFORMATION about petroleum products of any kind or the name of your distributor, write or call any of the companies listed below.

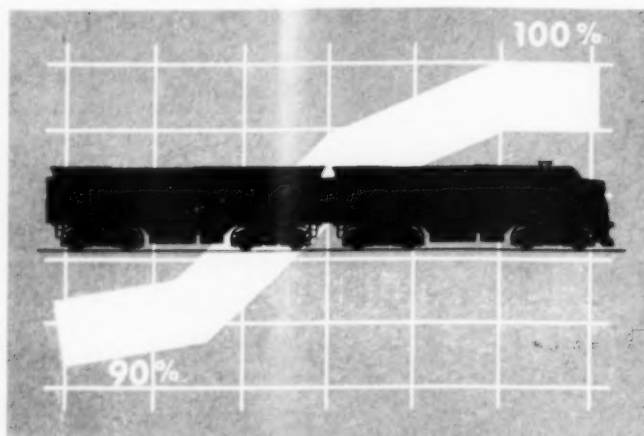


How CHEVRON Starting Fluid Starts Gasoline and Diesel Engines Instantly



- A. Atomizes in lowest temperatures and provides easily ignited vapor in combustion chamber.
- B. Pressure, or the weakest spark, fires mixture—turns engine and heats air for regular fuel mixture.
- C. Contains lubricant and additives—inhibits cylinder wear and ice formation in primer equipment.

STANDARD OIL COMPANY OF CALIFORNIA, San Francisco 20 • STANDARD OIL COMPANY OF TEXAS, El Paso
THE CALIFORNIA OIL COMPANY, Barber, New Jersey • THE CALIFORNIA COMPANY, Denver 1, Colorado

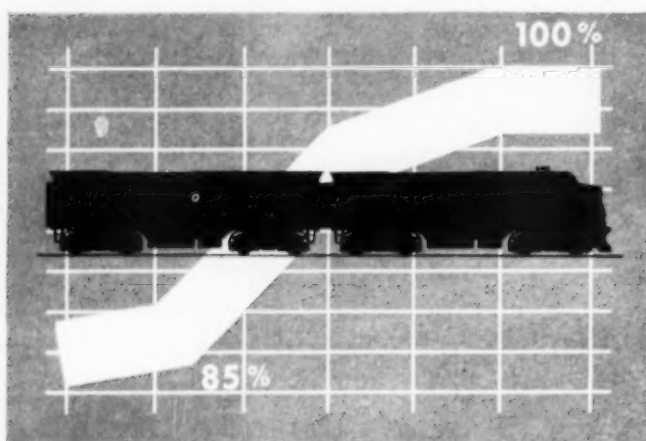


A railroad that was 90% dieselized at the beginning of 1952, and completely dieselized at the end of the year with the addition of 37 Diesel units, had a saving in locomotive expenses* of \$1,367,860 as compared with 1951—

**Annual saving per Diesel unit—
\$36,900**

A Tale of Two Railroads

—and how Complete Dieselization paid off!



Another railroad that went from 85% to 100% dieselization in 1952, by installing 20 additional Diesel units, showed a saving in these same expenses* of \$804,837 for the year—

**Annual saving per Diesel unit—
\$40,200**

*Includes fuel, water, lubrication and maintenance of fuel and water stations.

These figures, from Interstate Commerce Commission Annual Reports, prove that the savings to be made in the final stages of railroad dieselization can equal or exceed those already gained with this modern motive power. In addition to the well-known fuel and maintenance economies of General Motors locomotives, *complete* dieselization enables railroads to dispense with water towers, coaling stations, cinder dumps and other steam-supporting facilities which must be maintained as long as any steam locomotives remain in operation.

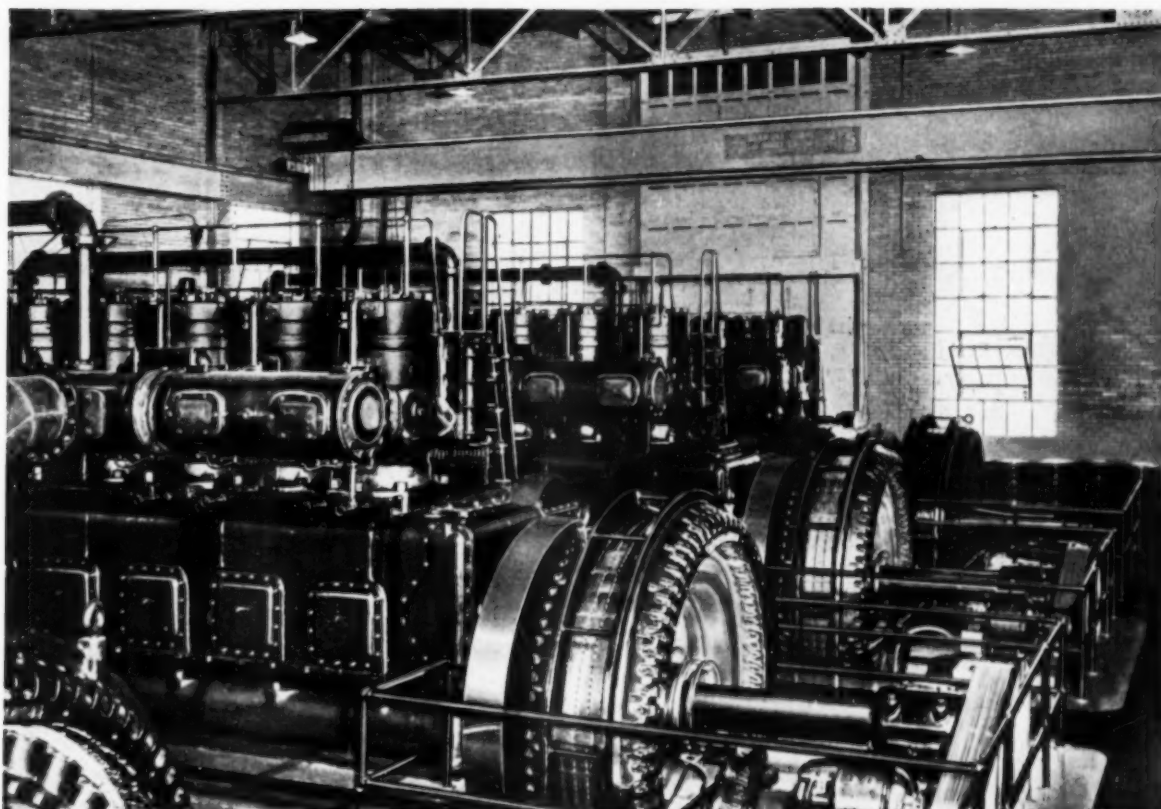
For the full story, write for free 28-page booklet, "How Complete Dieselization Pays Off."



ELECTRO-MOTIVE DIVISION • GENERAL MOTORS

**GENERAL MOTORS
LOCOMOTIVES**

LA GRANGE, ILLINOIS • HOME OF THE DIESEL LOCOMOTIVE
IN CANADA: GENERAL MOTORS DIESEL, LTD., LONDON, ONTARIO



"We're Proud of This Plant!"

says Don H. Decker,— Plant Supt., Thumb Electric Cooperative, Ubly, Mich.

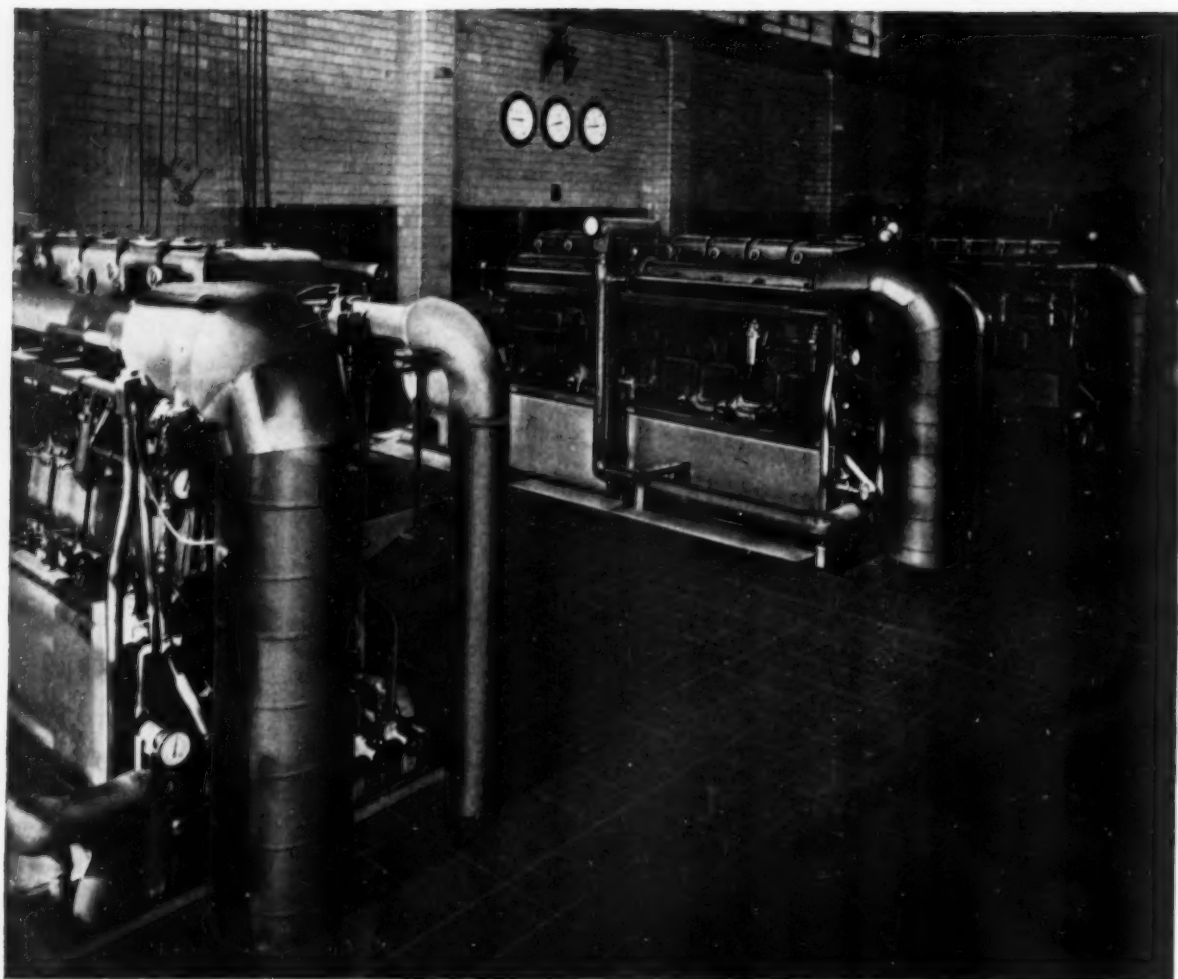
Manager Orville Hurford and Mr. Decker are justifiably proud of their 4-diesel engine generating station. The plant has been an outstanding financial success since the day it was first opened. Several times it has occupied #1 position on the REA Running Plant capacity chart.

Mr. Decker writes, "A large part of our operating success we attribute to Sinclair GASCON® D oil. It has given us an excellent rate of consumption while reducing wear. In fact, *cylinder and piston ring wear is much below normal based on other plants of equal capacity.* Something else we appreciate is the timely visits of the Sinclair Lubrication Engineers."

Top quality lubricants plus the assistance of Sinclair Lubrication Engineers are two of the reasons why Sinclair can play a large part in the success of *your* operation. Your local Sinclair Representative will be happy to explain the remaining reasons. Phone him or write Sinclair Refining Company, 600 Fifth Avenue, New York 20, N. Y.

SINCLAIR DIESEL LUBRICANTS

save Wear and Replacement



Special Treatment

for power problems

No two sewage plants or water works have the same power requirements. Each installation calls for special, almost "tailor made" specifications. And that's where Chicago Pneumatic can be of help — whatever the job requirements, if you are interested in dependable power at low cost, there's a CP Diesel, dual-fuel or straight gas engine that will suit your needs to a "tee." Our skilled engineers will gladly work with you in making plans and specifications for sewage treatment plants and water works where CP equipment has use. For more information write *Chicago Pneumatic Tool Company, 8 East 44th Street, New York 17, N. Y.*



Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES



Smooth Starts mean low operating costs

WHEN a rear-dump truck pulls away smoothly from a shovel with a 30-ton pay load—without jolts and jerks—it's sure to stay on the job longer with less down time.

Trucks equipped with Allison TORQMATIC converters and transmissions always start smoothly—because TORQMATIC DRIVES absorb these shocks instead of transmitting them to other truck parts.

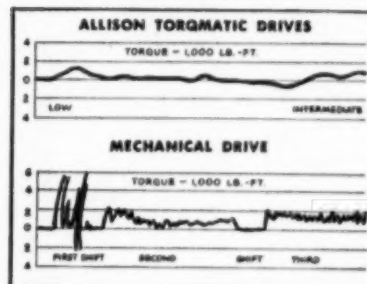
To demonstrate this, Allison engineers measured power-train shock loads in a large number of earth-moving, coal and ore-hauling trucks under both normal and extreme operating conditions. These charts show the results.

Trucks equipped with Allison TORQMATIC DRIVES showed starting shock loads four times less severe than trucks using mechanical drives. Furthermore, trucks equipped with Allison TORQMATIC DRIVES were quick-shifted at full throttle.

If you're operating off-highway trucks or other heavy-duty earth-moving equipment, specify Allison TORQMATIC DRIVES, the matched team of torque converter and hydraulic transmission. Ask your dealer, equipment or engine manufacturer for further information or write to:

ALLISON Division of GENERAL MOTORS
Box 894DD, Indianapolis 6, Indiana

POWER-TRAIN SHOCK LOADS



Note the jagged line—shock loads—as the mechanical drive truck pulls away from the shovel and shifts from first to second gear. Compare the smooth line—no harmful shock loads—for the truck equipped with Allison TORQMATIC DRIVES.

MATCHED UNITS BUILT BY ONE MANUFACTURER



COMPACT, EFFICIENT HYDRAULIC DRIVE FOR TRUCKS * CRANES * TRACTORS * SHOVELS * DRILLING RIGS * SCRAPERS

GULF DIESELMOTIVE OIL



Shown here is the Cordelia, one of two new Diesel tugboats put into service in New York Harbor by the New York, New Haven, and Hartford Railroad. Each is powered by a 16-cylinder, 2-cycle General Motors engine as shown in the inset. Gulf Dieselmotive Oil was selected to lubricate these powerful engines in order to insure dependable and economical operation under the demands of exacting schedules.

The new Diesel tugs will move floats carrying as many as twenty loaded freight cars between New Jersey ports and freight traffic terminals in New York. Despite tides, heavy traffic, storms and ice, the freight cars, many loaded with perishable

selected for New Diesel Tugs



goods, must move on railroad timetables twenty-four hours a day, every day of the year. The tugs are fueled with Gulf Diesel Fuel Oil as well as lubricated with Gulf Dieselmotive Oil.

Gulf Dieselmotive Oil ranks very high with marine operators because of outstanding performance, due in part to Gulf's 100% solvent refining of choice base stocks. This superior refining, plus the right combination and right concentration of the right additives, insures cleaner engines—fewer harmful deposits on pistons and rings. You benefit through longer service between overhauls and greater availability of equipment.

Call in a Gulf Sales Engineer and ask him to recommend the proper grade of Gulf Dieselmotive Oil for your operation. A Gulf Sales Engineer is always "on call" at your nearest Gulf office.

Gulf Oil Corporation • Gulf Refining Company

PITTSBURGH 30, PENNSYLVANIA



support

**Junior
Achievement**

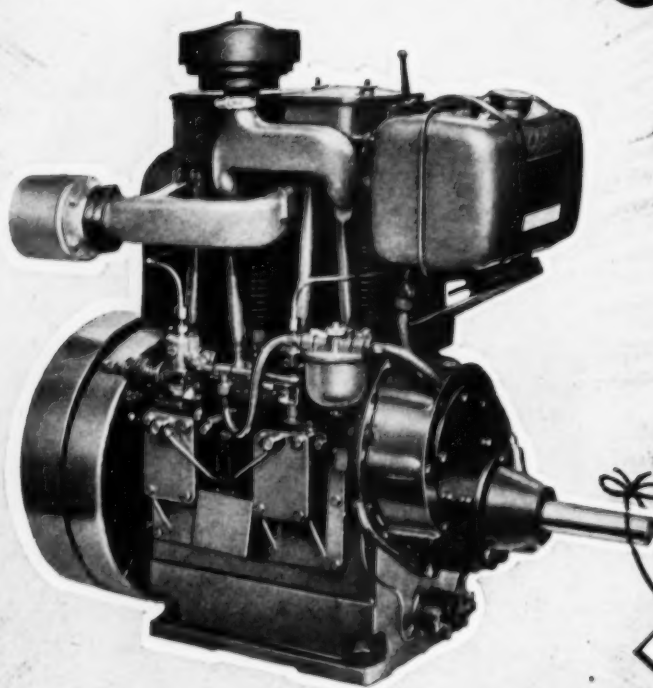
Junior Achievement Week
January 31-
February 6, 1954





Diesel Engines

AIR-COOLED
WATER-COOLED
3 H.P. TO 40 H.P.



LOW COST

BY A WORLD-WIDE
AND SERVICE ORGANISATION
THE 350,000 ENGINES IN USE

- MARINE AUXILIARIES
- GENERATORS
- PUMPING EQUIPMENT
- COMPRESSORS
- REFRIGERATION
- OIL FIELD EQUIPMENT
- MINING EQUIPMENT
- AGRICULTURE MACHINERY

WRITE FOR INFORMATION

A FEW CHOICE DISTRIBUTORSHIPS OPEN

PETTER

ENGINE DIVISION OF BRUSH ABOE INC.

Office and Showroom 80-82 39th AVE. WOODSIDE, NEW YORK



21,000 hours young!

● This 1320-hp diesel engine has provided many hours of economical service for the City of Benson, Minnesota, Water and Light Department since it was installed in October, 1948. It has been operated on an average of 20 hours each day and has generated over 13 million KW at an average load factor of 75%.

In this hard-working diesel, the lubricating performance of STANDARD HD Oil has been outstanding, particularly in view of the fact that crude oil has been used as fuel. Visual evidence of the clean, protective lubrication provided by STANDARD HD is presented in the above unretouched photograph of a piston removed from the diesel after 21,000 hours'

operation. Deposits are at a minimum; rings are free. The original fill of STANDARD HD has not been changed, yet a recent examination and analysis of the oil showed it to be in excellent condition.

Diesel operators throughout the Midwest are receiving service like this from STANDARD HD Oil. The Standard Oil lubrication specialist serving in your section of the Midwest will be glad to give you information about the use of STANDARD HD in plants near your own. Just phone your local Standard Oil office. Or, write: Standard Oil Company, 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY



(Indiana)



If disaster strikes, everybody will want help at once

Imagine they just dropped an atom bomb.
(And maybe they will tomorrow. Who knows?)
You pick yourself up. You're unhurt.
Must have gone off some distance away.
Lucky that flying glass didn't get you.
Several fires out there in the plant.
Lots of casualties, too. Better get going.
Reach for the phone. It's dead. Well, you
might have known.
Ambulances, fire engines, doctors, that's
what you need.
And quick.
You've never needed help like you need it now.
But the same goes for everyone else in town.
Thank God Jones made all those people go to
the first-aid classes.
Looks like they'll be the only help you'll get
for hours.
Thank God they've got plenty of dressings,
splints and stuff.
Remember when you got sore at Jones?
("All this stupid first-aid malarkey," you
called it.)

Know better now, don't you?
Place looks like a tornado hit it.
Maybe that's what it was?
Whatever it was, better get busy.
There's plenty to do. Thank God you
were ready.

Whatever the emergency is—you can be
ready for it. That's just good business.
Take these precautions **TODAY**.

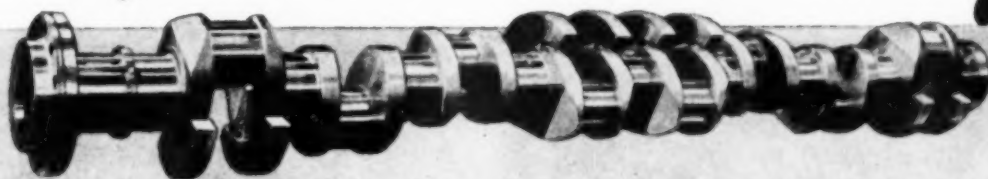
- ☐ **Enlist the help** of your local Civil Defense Director.
- ☐ **Check contents** and locations of first-aid kits.
- ☐ **Send staff** to Red Cross courses.
They may save your life.
- ☐ **Promote preparedness** in your community. Your local CD Director can show you how.

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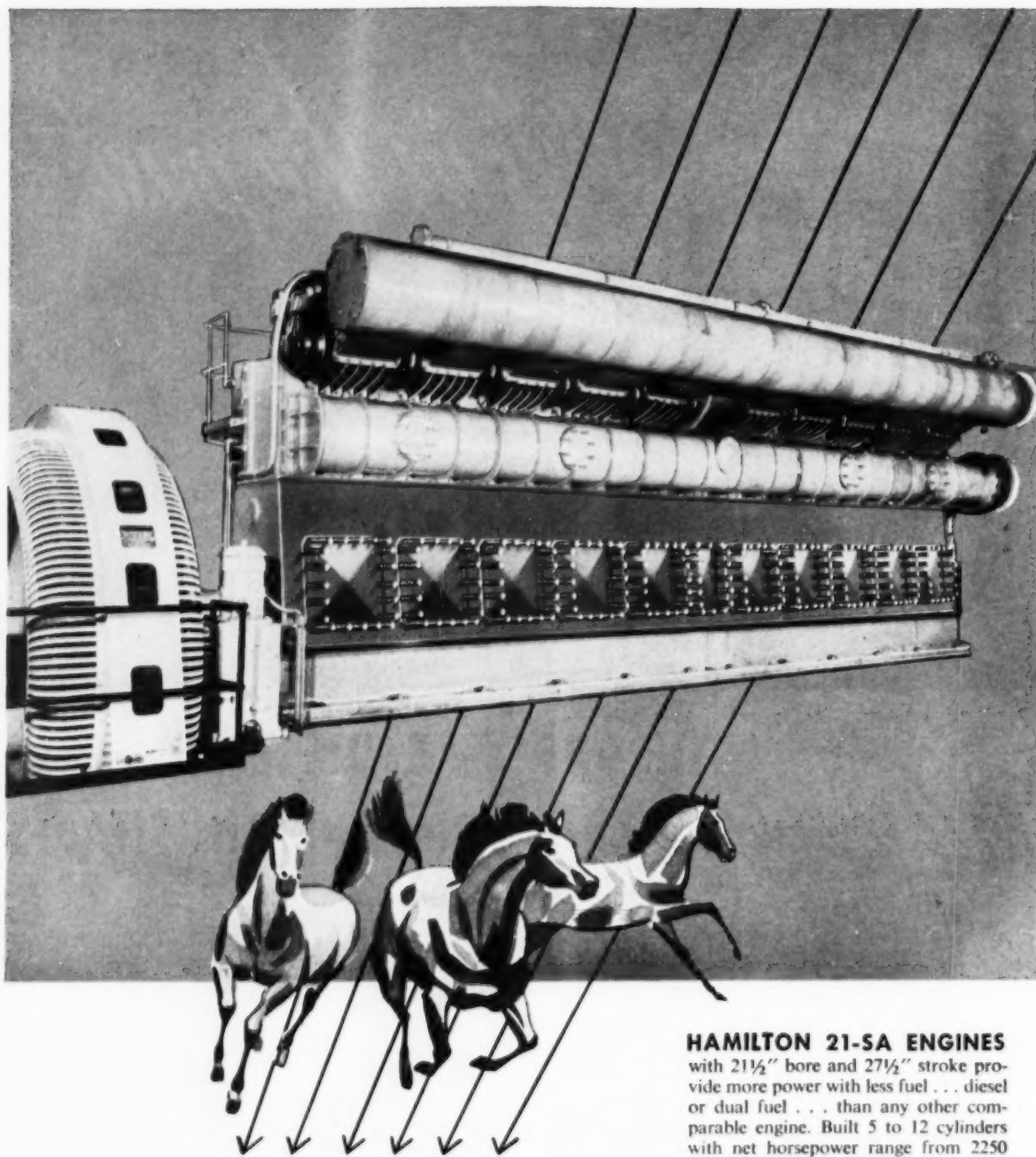


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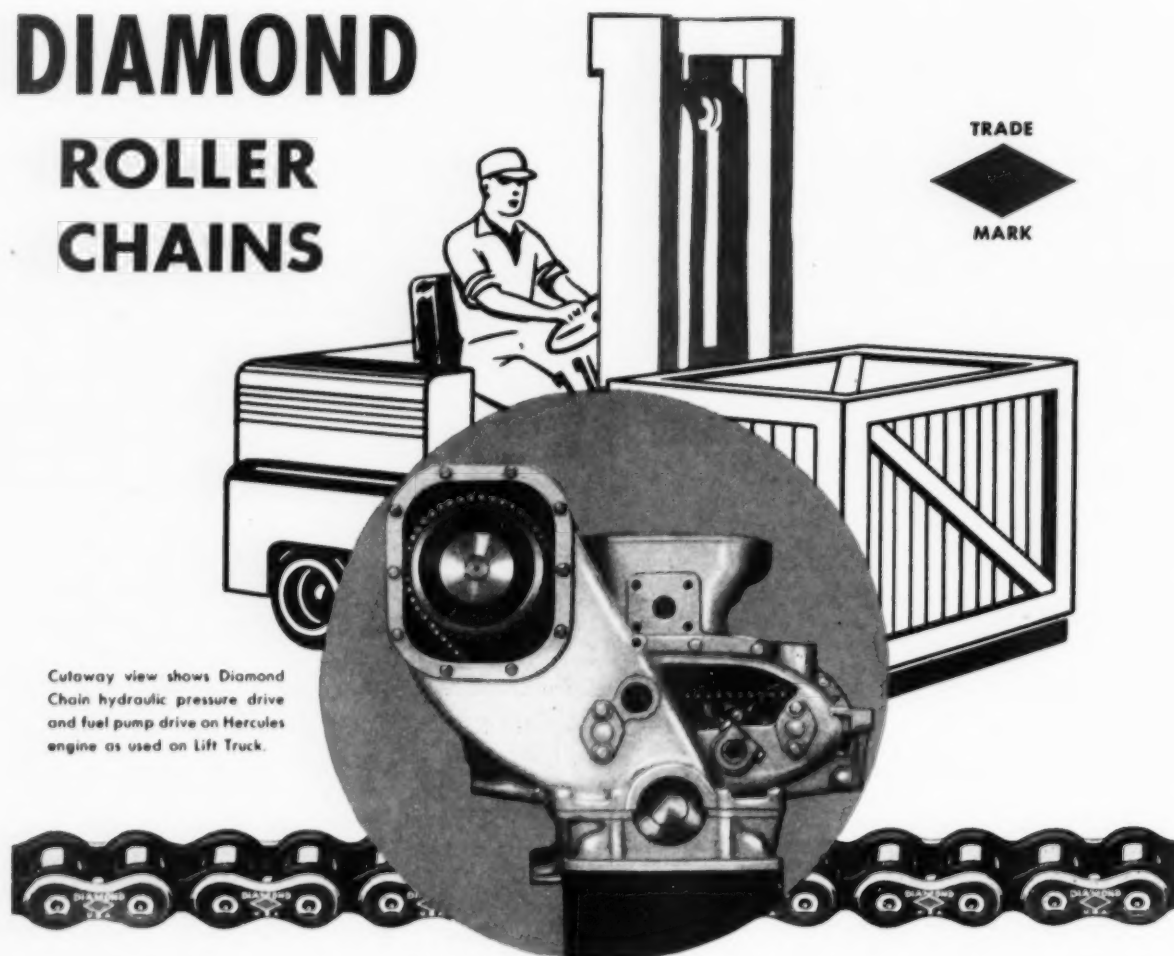
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FRONT COVER ILLUSTRATION

The tugboat, 65 ft. long, 18 ft. wide, and built in 1947 by the New York Shipbuilding Corp., is shown here in the New York Harbor. The tugboat is shown in the foreground, with the New York Harbor in the background.

DIAMOND ROLLER CHAINS



Cutaway view shows Diamond Chain hydraulic pressure drive and fuel pump drive on Hercules engine as used on Lift Truck.

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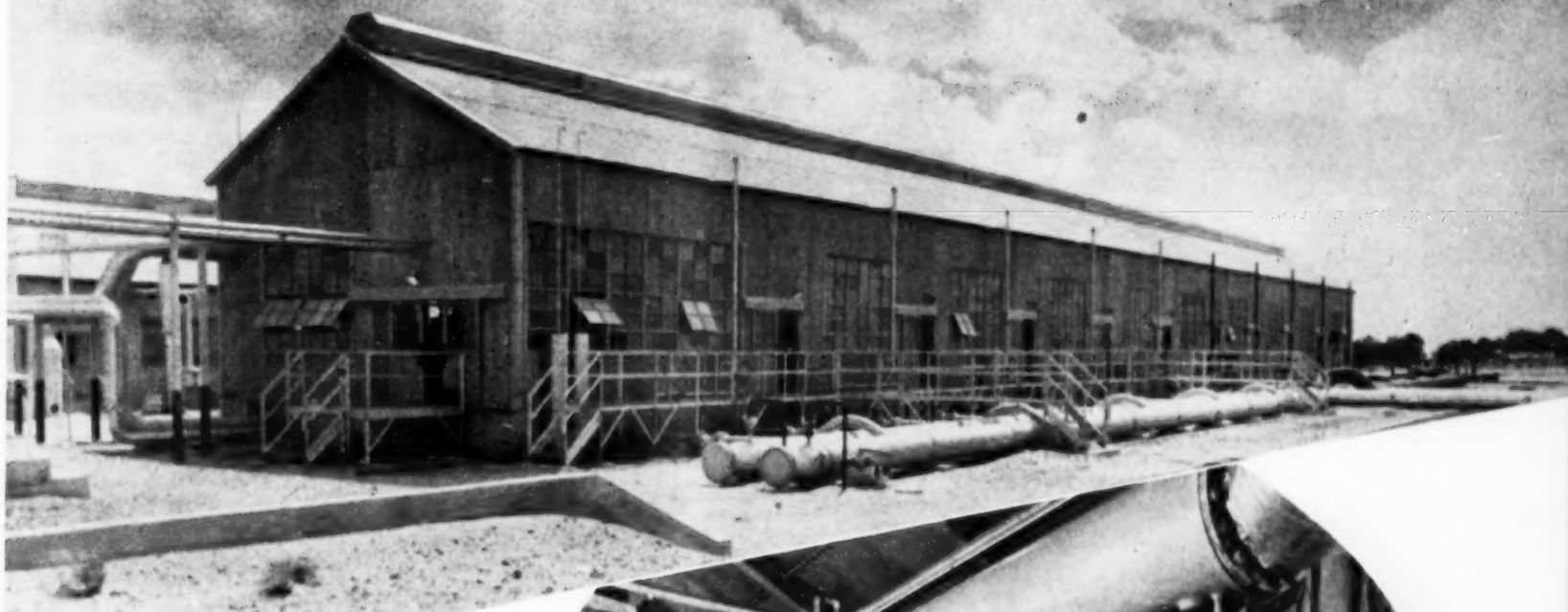
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DIAMOND  **ROLLER CHAINS**

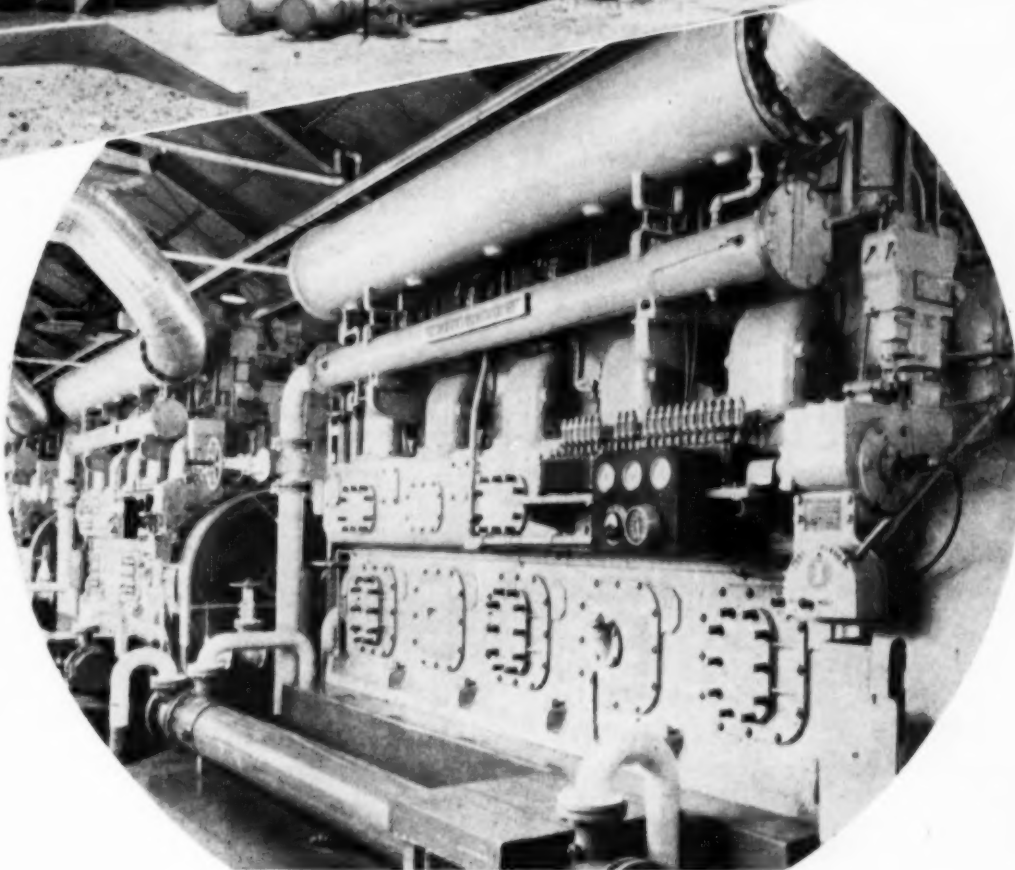
EL PASO'S NAVAJO STATION



DEEP in the Navajo Indian reservation in Arizona, the El Paso Natural Gas Company's Navajo Station is moving 167,000,000 cubic feet of gas per day through a 24-inch pipeline from the newly developed San Juan Basin in New Mexico to distribution systems serving Northern California. Navajo Station, which now has ten Worthington angle gas engine-compressors, was the first station to inaugurate service in this 423-mile line from the gas fields in the Northwest corner of New Mexico to Topock, Arizona, where the gas is fed into the lines of the Pacific Gas and Electric Company.

When present construction is completed, there will be four stations handling 267,000,000 cu. ft. per day, but for more than a year and a half, Navajo has worked alone, carrying the entire load. The station went into service on September 16, 1951 with five Worthington Uniflo UTC-165 gas engine-compressors with a combined rating of 3,950 horsepower at the elevation of 6,800 ft. As the gas field was brought in, the operating schedule for these first five units was increased steadily until they were in virtually continuous service. In January, 1953, two of the engine-compressors ran 100 percent of the time, two more than 99 percent of the time, and the plant average was more than 97 percent.

The engines were well loaded, developing 96.8 percent of available brake horsepower hours. By this time, work was in progress on the installation of another five identical engine-compressors, the first two of which were put on the line in February, 1953. This expansion will be adequate to handle the projected 267,000,000 cu. ft. per day. But this by no means represents the maximum for El Paso Natural Gas or for Navajo station. The company has applied for permission to construct new facilities at a cost of more than \$175,000,000 to increase main line delivery capacity by another 400,000,000 cu. ft. per day. The project will include a new 30-inch pipeline from the Permian Basin across the entire state of New Mexico to a point near Gallup where it will join the 24-inch line from the San

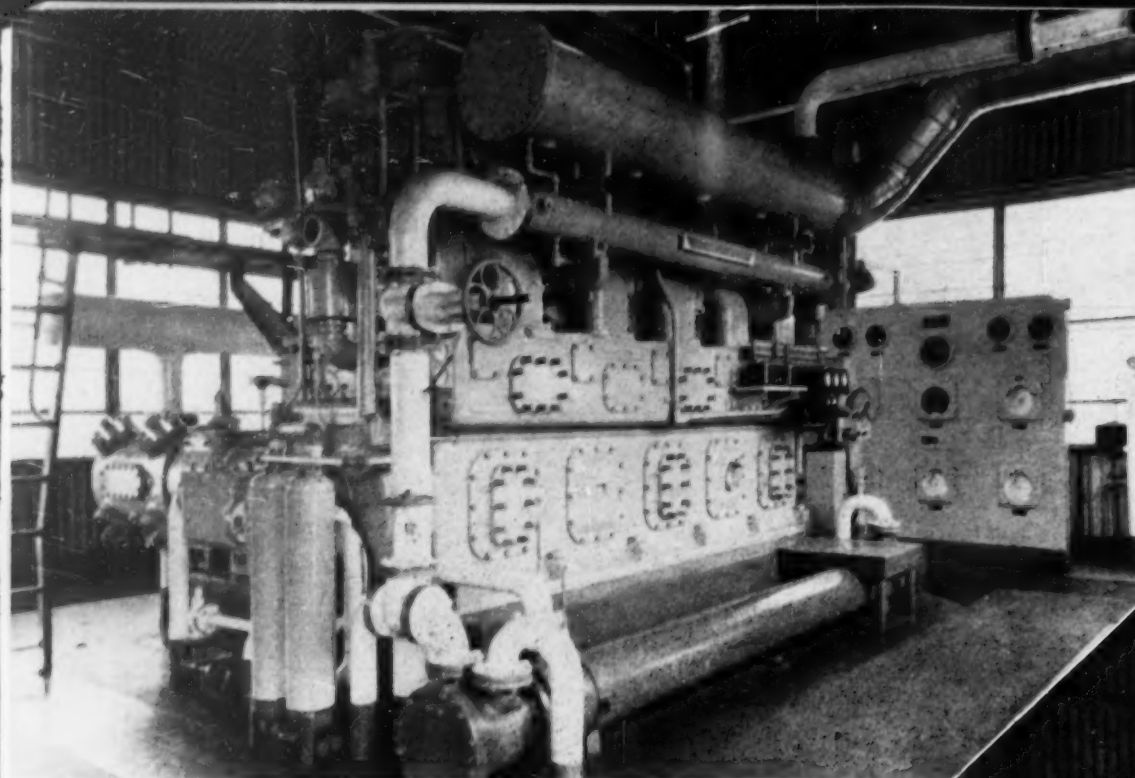


This view of the Worthington engine-compressors shows the power side of the gas engines with the Woodward governors, McCord cylinder lubricators, U. S. Gauge temperature and pressure gauges and Kewanee-Ross lube coolers.

Juan Basin. The 30-inch line will then parallel the San Juan line westward and connect with the existing 30-inch loop at the far western section of the San Juan line. Naturally, this expansion will involve other lines, purification plants, gasoline extraction plants, and increased compressor capacity. Navajo station will get additional, larger engine-compressors which will raise total capacity to 14,000 horsepower.

The greater production envisioned for the future in no way minimizes the man-size job already being done by Navajo Station. From the company's San Juan River plant with its gasoline absorption, purification, dehydration and compressor facilities, gas moves 138 miles through the 24-inch line to Navajo,

reaching that station at a gauge pressure of about 500 psi. The gas is compressed and discharged at approximately 845 psi. which is sufficient to move it 285 miles to the delivery point at Topock, Arizona. Gas enters the station through three suction valves, one to the bypass line and the other two leading to a pair of horizontal scrubbers. Suction and discharge valves are shut off automatically by solenoid-controlled gas cylinders in the event of a drop in gas pressure or a power failure. This emergency shutdown system can also be actuated by a central push-button control. The valve that bypasses the station is manually controlled. A means has been devised for putting oil into the scrubbers while they remain in operation. The oil flows by gravity from a pair of elevated supply tanks into



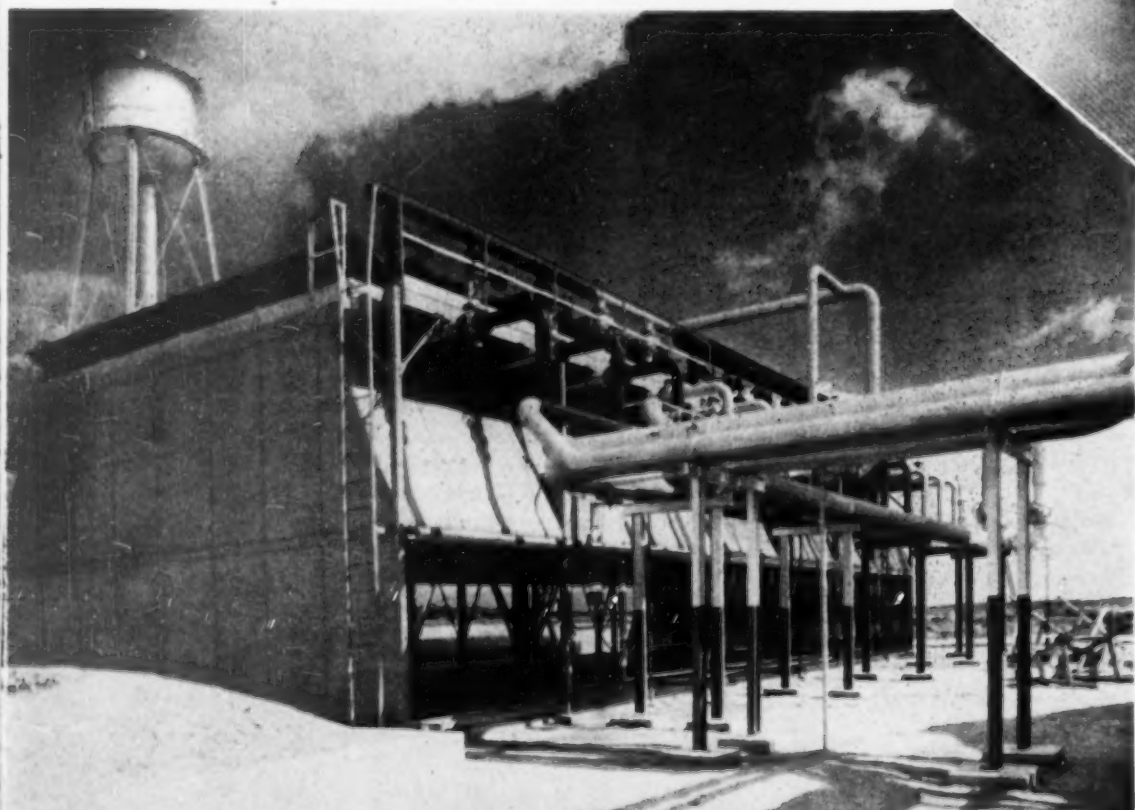
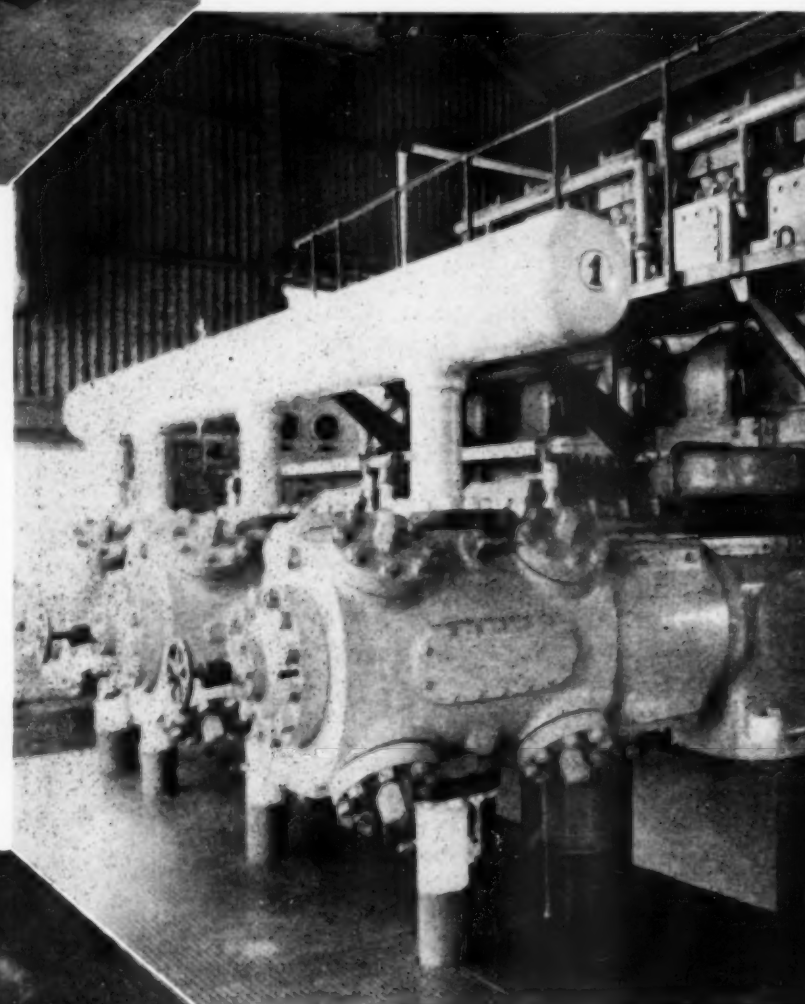
a small header which is connected to the scrubbers by a 22-inch line and T-connection. Gas from the station discharge header is then admitted to the oil header and forces the oil into the scrubbers.

After cleaning in the scrubbers, the incoming gas goes to the suction header and through individual line and valve to each engine-compressor. The Worthington Uniflo UTC-165 has five vertical power cylinders of 16-in. bore and 16-in. stroke driving (in this case) three horizontal compressor cylinders of 8½-in. bore and 16-in. stroke off the same crankshaft. Operating at 320 rpm., this engine has a sea level rating of 1,000 hp. but is derated to 790 hp. at Navajo's 6,800 ft. altitude. From the compressors, gas goes to the station's discharge header and then through an induced-draft, dry air cooler before leaving the station through the discharge valves. Gas comes in at a suction temperature of about 48°F., reaches a discharge temperature of about 120°F. after compression and is cooled to around 90°F. The engine-compressors

Close-up of the UTC-165 gas engine-compressors shows Bendix-Scintilla magnetos and Cuno and Engine Life Products lube filters.

Each Worthington engine-compressor has five 16-in. by 16-in. vertical power cylinders driving three 8½-in. by 16-in. horizontal compressor cylinders.

This Fluor Fin Fan unit cools engine jacket water for all engines in the plant and also the water used to cool lubricating oil. There are 12 coil sections and 3 fans.

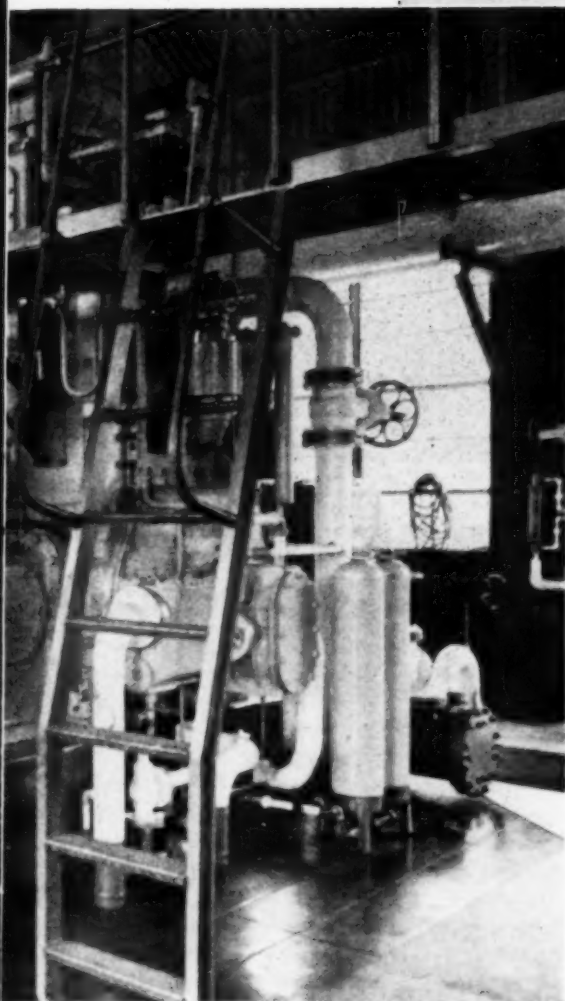


use as fuel part of the natural gas they compress. Fuel is tapped from the suction header with one line serving the ten big units and another line the two engine-generator sets in another building. Engine cooling water is used to heat the gas so that the fuel does not freeze when pressure is reduced for use in the engines. Double ignition at every power cylinder is provided by a pair of magnetos for each engine. The ready availability of economical natural gas does not lessen the company's interest in fuel economy. In the month of February, 1953, with seven units in operation, the engines consumed 30,476 mcf. of fuel to compress 4,154,930 mcf., an average of 7.33 cu. ft. per mcf. compressed.

An engine-driven gear pump supplies lubricating oil under pressure to all bearings and valve gear

while a force feed lubricator sends oil to the power and compressor cylinders and to the compressor stuffing boxes. Included in the pressure system for each engine is a lube cooler, a full-flow strainer and a bypass waste-packed filter. Lube oil also is used effectively to cool the pistons. Four motor-driven centrifugal pumps circulate engine cooling water through the engine jackets and through eight coil sections of a dry-type cooler served by two motor-driven fans. A thermostatically-controlled valve bypasses water around the cooler as necessary to maintain desired water temperature. Three motor-driven centrifugals circulate water through the lube coolers and four coil sections of the dry cooler served by a single fan. All makeup water is treated in a softener before being supplied to the cooling system by a separate makeup pump. Scav-

Scavenging air for the Worthington Uniflo engines is drawn through Burgess-Manning filters and snubbers. Exhaust gases vent through Burgess-Manning snubbers.



enging air for the two-cycle Uniflo engines is drawn through an intake snubber and filter for each unit. Air enters the power cylinder through ports around the entire circumference of the lower end of the cylinder and sweeps the exhaust gases out through the exhaust valves in the cylinder head. From the exhaust header, the spent gases vent through a vertical snubber outside the plant.

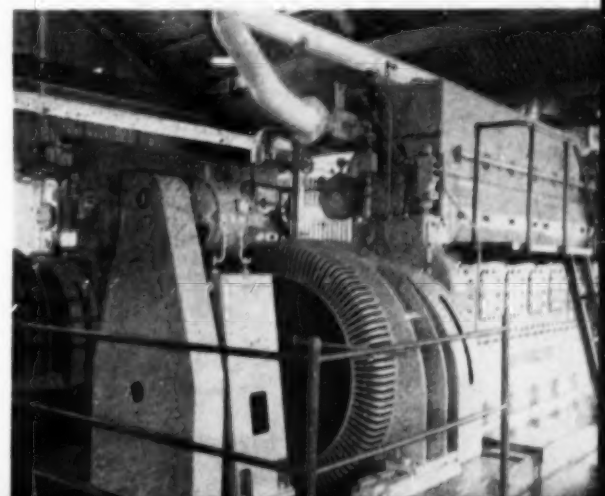
Located in Indian country, Navajo station has to be self-sufficient. Electricity for plant lighting, operation of motor-driven auxiliaries, and domestic use in the homes of operating personnel is supplied by a pair of CCG6 Worthington gas engines, each of which is rated at 353 hp. at the 6,800 ft. elevation. Each engine drives at 450 rpm. a 245 kw. Electric Machinery synchronous generator with 7.5 kw.

belt-driven exciter mounted over the outboard bearing. One engine handles the load easily with the second providing complete standby protection. The units are alternated in service to give each an equal share of the work. For example, in February, 1953, one engine ran 335 hours, the other 337 hours. Total production was 109,000 kilowatt-hours. Fuel consumption was 1,428 mcf. of natural gas with an engine load that averaged less than 50 percent of sea level rating. Lubricating oil consumption was extremely low with the engine averaging more than 14,000 rated horsepower-hours per gallon of lube. Included in the auxiliary building are a switchboard, a control center for all electrically-operated plant auxiliaries, accessory equipment for the engine-generator sets, the pumps for the plant cooling water system, and three air compressors, two motor-driven and one driven by a gas engine. Under the supervision of R. W. Harris, operations manager of the San Juan Division, the Navajo station is operated by superintendent C. A. Treadwell and chief engineer J. F. Donohue. One interesting feature in the operation of this modern efficient station is the employment of a number of Navajo Indians on the operating staff. Navajo Station is well into its second year of service, supplying natural gas to numerous municipalities in Arizona and delivering the bulk of its output for use in the San Francisco area. Each of the original engine-compressors already has topped 10,000 hours of operation. But this is just the beginning. The future promises vastly expanded service for an enlarged Navajo Station.

All electricity for the station is provided by these two CCG-6 Worthington natural gas engines. Electric Machinery generators and exciters and Woodward governors. They feature Bendix magnetos, Hilco and Cuno lube filters and Ross oil coolers.

List of Equipment

Engine-compressors—Ten UTC-165 Uniflo Angle Gas Engine compressors.
Engine-generator sets—Two CCG6, 10 $\frac{3}{4}$ x 14 $\frac{1}{2}$ in., 450 rpm., 353 hp. at 6,800 ft., 4 cycle gas engines. Worthington Corporation.
Governors—Woodward Governor.
Valves—Nordstrom.
Scrubbers—Stearns-Rogers.
Gas cooler—Fluor.
Intake filter-snubbers—Burgess-Manning.
Exhaust snubbers—Burgess-Manning.
Lube oil—Rotella 40, Shell Oil.
Lube filters—Cuno Engineering, Engine Life Products, Hilliard.
Cylinder lubricators—McCord.
Lube coolers—Kewanee-Ross.
Water cooler—Fluor.
Cooling water pumps—Allis-Chalmers.
Water softener—Inflico.
Magnetos—Bendix-Scintilla.
Exhaust pyrometers—Alnor.
Generators—Electric Machinery.
Switchboard—Westinghouse.
Control center—Westinghouse.





Exterior of the Edmonton Station, Trans Mountain Oil Pipeline Company. Note Maxim silencers and waste heat recovery boilers.

TRANS MOUNTAIN PIPE LINE OPENS NEW CANADIAN OIL MARKETS

With permission and through the courtesy of World Petroleum we quote liberally from their excellent article in their November issue on this, the most important pipeline development of the past year.

FIRST Alberta crude to reach the Pacific Coast via pipe line arrived from Edmonton through the 718-mile Trans Mountain Oil Pipe Line Company line Thursday afternoon October 15 when a brief opening ceremony was held at the Trans Mountain terminus in Burnaby, ten miles from the city of Vancouver.

Construction of the Trans Mountain oil pipe line is a logical outgrowth of the rapid expansion of oil production in the prairie provinces of Canada. Following the sensational discovery of Leduc in February 1947 and of Redwater early in the following year, a whole series of fields of varying extent were brought in in rapid succession. It soon became evident that Alberta and its neighboring provinces constituted one of the potentially great fields of the world. Within a couple of years the wells in operation were able to supply more than the requirements of the local markets, and a system of proration had to be established to limit output to the needs of the immediate area.

Known reserves, which were estimated at slightly over a billion barrels in 1950, have now risen to around two billion, although only a small propor-

tion of the potential oil bearing area has been subjected to prospecting. Obviously the utilization of the resources of western Canada could take place only by providing access to distant markets.

The first step in this direction was taken in 1950 with the building of the Interprovincial Pipe Line, 1,127 miles long, from Redwater, Alberta, to Superior, Wisconsin, with tanker connection extending deliveries to refineries in Ontario. To supplement lake transportation, an all-land line is now being built from Superior to Sarnia, Ontario.

Another market beckoning to Alberta producers was the Pacific Coast section of Canada and the northwestern region of the United States. This rapidly developing district had been dependent on California for its supplies, but these were becoming inadequate to the state's own needs, requiring imports from overseas.

In 1950, studies of possible pipe line routes from Alberta to the Pacific Coast were made under direction of S. D. Bechtel and his associates in the Bechtel organization, and in March 1951 the Trans Mountain Oil Pipe Line was chartered under a



S. D. Bechtel, chairman, Trans Mountain Oil Pipe Line Co.

special act of the Canadian Parliament. Later in the same year, a permit was granted by the Board of Transport Commissioners of Canada authorizing the company to construct and operate a crude oil line from the vicinity of Edmonton, Alberta to Vancouver, British Columbia. This permit was later amended to provide for the building of a spur line from Sumas, British Columbia, to the international border in anticipation of deliveries to refineries in the Puget Sound area. Meanwhile, the company had assured itself of supplies to fill the line by contracts with leading producers in Canada.

After thorough engineering inspection by aerial and surface studies, a course was selected for the line following the Canadian National Railway for 510 miles westward from Edmonton, and crossing the Rockies through Yellowhead Pass at an elevation of 3,720 feet, only 1,400 feet higher than Edmonton. A second high of 3,900 feet is traversed on the plateau south of Kamloops, British Columbia, and the Coast Range is crossed through Coquihalla Pass at 3,760 feet. The route traverses 50 miles of wheatland, 200 miles of rolling timber country, 398 miles of mountains, valleys, plateaus and canyons, and 70 miles of farmland. Total length of the main line is 718 miles. In addition there is the 5½-mile spur from Sumas Junction to the international boundary. Throughout its course, the 60-foot right-of-way has 72 stream and river crossings, 56 highway crossings and 24 crossings of two railway lines.

While the physical characteristics of the route presented no difficulties that professional pipe line engineers regard as extraordinary, much of it lay in mountainous country with few roads, and special hydraulic problems were presented by the sections between Yellowhead Pass and Kamloops where the line drops 2,600 feet in 300 miles and down the Coquihalla Pass where it descends 3,600 feet in 30 miles. Based on probable requirements of the line, it was decided to use pipe of 24 inch diameter which, with two pump stations, was calculated to provide an initial capacity of 75,000 barrels daily. Later it was decided to move the starting point of the line 19 miles eastward to East Edmonton, and to increase daily capacity to 150,000 barrels by adding two more stations, increasing the number of pumps in the original sections and adding to the storage capacity at the terminals. By raising the number of pump stations to six, a later capacity of 200,000 barrels daily is expected to be reached.

Construction of the line was assigned to Comstock Midwestern Ltd., Mannix Ltd., and Canadian Pipeline Construction Co. Ltd. Actual construction began February 27, 1952 and during the remainder of the year, 329 miles of pipe were laid, including major crossing of the Athabasca, Saskatchewan, Pembina and McLeod rivers.

During 1953, construction was speeded up. A contract for 53 miles of the easterly section of the line was placed with Anderson International Contractors Ltd., and Missouri Valley Canadian Ltd. undertook the 2,350-foot crossing of the Fraser River at Fort Mann. This was considered one of the most difficult jobs in the whole undertaking, but it was

successfully accomplished by welding two sets of pipe, mounting them on dollies on a narrow gauge railway, applying the enamel coat and wrapping, placing rings of concrete to hold it at the bottom of the stream and then pulling it across with two powerful winches. The steep Coquihalla Canyon spread was completed on September 28, and the final 25-mile gap to Burnaby on Vancouver harbor was closed on September 30.

The four pump stations which are to move oil through the pipe line are designated as follows: "Edmonton," located six miles east of the city of that name; "Edson," nine miles west of Edson, Alberta; "Black Pool," seventy miles north of Kamloops, and "Kamloops," four miles west of Kamloops.

With one unit each operating at Edmonton and Kamloops, the line has a capacity of 75,000 barrels daily. This may be increased to 120,000 barrels daily by operating two units each at Edmonton, Edson and Kamloops. To increase the capacity to 150,000 barrels daily, two units operating at each of the four stations including Black Pool are required. The third at each station serves as standby.

Much study has been given to the comparative merits of parallel and series arrangements of the station pumping units. It was finally determined that the parallel arrangement was more economical for the high static head conditions encountered at

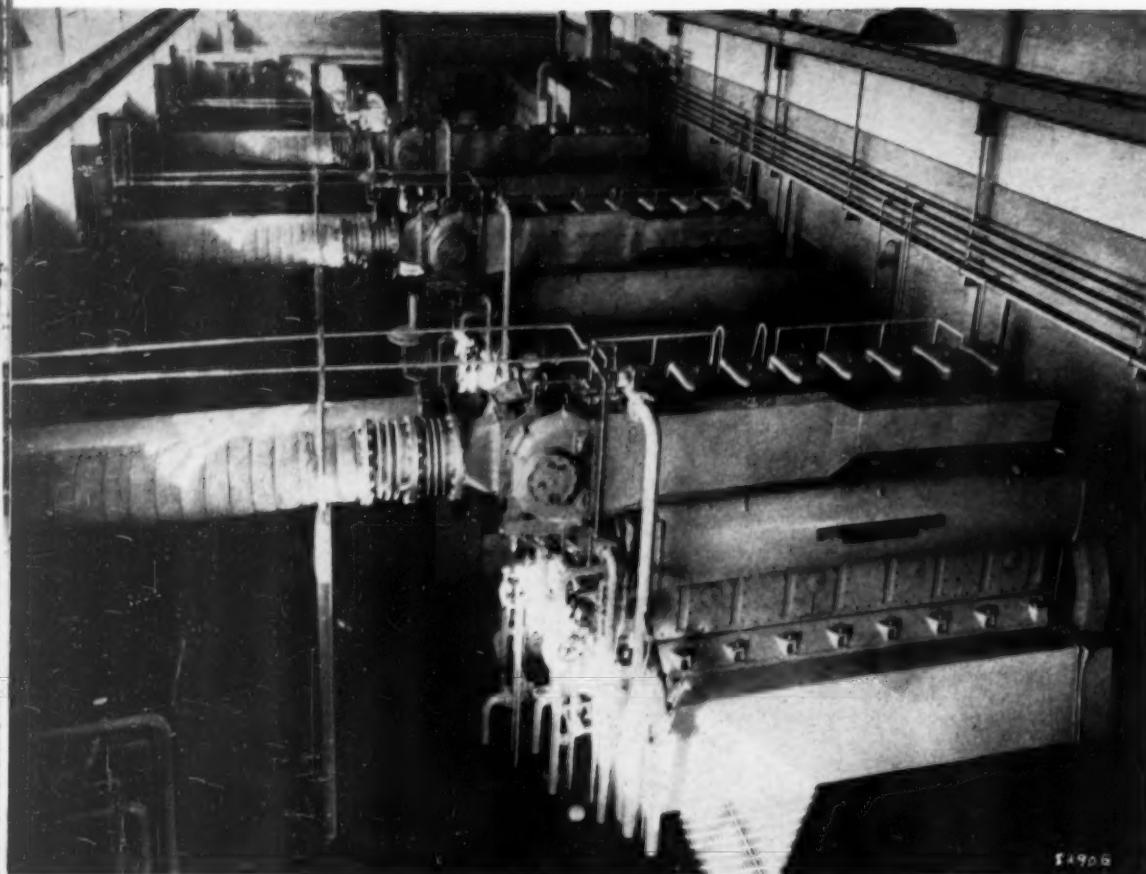
Edmonton, Black Pool and Kamloops, and that series arrangement was more suitable for Edson and later for Gainford and Jasper.

At Edmonton, with a throughput of 120,000 barrels daily, the static lift will be about 15 percent of the total pumping head. Similarly, at Kamloops the static lift will be about 65 percent. Under such conditions parallel unit operation is of distinct advantage because flows up to 75,000 barrels daily can be handled by operation of a single unit. If series units had been installed, two of them would have to be operated either throttled or at reduced speeds and at greatly reduced fuel efficiency. The line's actual throughput demand could not be predicted closely and it was economical to install station equipment in rather large increments. For this reason the parallel pumping units at the high static lift stations offered the most economical and flexible arrangement.

Although the line flow can be manually controlled with the station tanks floating on the line, three types of automatic engine control devices at stations are being provided: (a) one group, sensed by unit flow meters, will distribute the load equally between the "parallel" pumping units; (b) another group will maintain station intake and discharge rates in synchronism; and (c) a third group, including Foxboro "Tivy Boxes," will permit automatic placing or substitution of pumping units into service.



One of the toughest portions on the route was the section through Coquihalla Pass. Route for machinery and bed for pipe had to be hewn out of solid rock.



The three Nordberg Dualfuel engines installed in the Edmonton Station of Trans Mountain Pipeline. Brown Boveri turbochargers and Nugent fuel oil filters at engines.



H. H. Anderson, executive vice-president and general manager for Trans Mountain.

D. L. Roberts, vice-president Canadian Bechtel Ltd.



The Engines

The Edmonton, Black Pool and Kamloops Stations are all equipped with three Nordberg Model FSG-138-8SC four-cycle supercharged, supairthermal diesel engines, bore 13 inch, stroke 16½ inch, rated at 1760 hp. at 500 rpm. The Edson Station is equipped with three Nordberg six cylinder diesels, same general model, rated at 1320 hp. at 500 rpm.

The Nordbergs at Edmonton differ from the others in that they operate on the dualfuel system, because natural gas is available in the Edmonton area, consequently it is more efficient to use than even the crude oil from the line. In this station diesel fuel is used for starting, stopping, and general stabilization of the combustion load. Of course these engines can also be operated continuously on diesel fuel or crude oil as is the case on this pipeline.

Lubricating oil is handled in all four stations in the same manner. Lubricating oil transferred from a Viking engine-driven lube pump passes through Winslow filters, a Ross oil cooler, then to a supply manifold on the front of the engine just above the bed plate flange and then distributed throughout the engine. The engine bed plate serves as the lubricating oil sump. The oil is drawn from this sump by another Viking engine-driven gear pump through a strainer. This pump discharges to a Winslow full-flow oil filter, then to the Ross lube oil cooler and back to the engine sump. When this engine sump is drained by gravity to a dirty oil sump it is taken from this sump through a U. S. Hoffman clarifier, processed and then returned to the engine.

The crude oil fuel system used at the Edson, Black Pool and Kamloops stations is of considerable interest and it stands as probably the most efficient system yet developed for burning crude oil of varying specifications in standard model diesel engines. The system used on the Transmountain Pipe Line was developed by the Union Oil Company at their Antelope, California Pipe Line Station (DIESEL PROGRESS—October, 1951 issue) in collaboration with the Winslow Engineering Company of Oakland, California, and the Sharples Corporation of Philadelphia. After two years' successful use of the combination of full-flow Winslow filters and a Sharples centrifuge, the Union Oil Company applied the same general system in converting their Junction, California Pipe Line station to the use of heavy crude taken directly from the line (DIESEL PROGRESS—September, 1953).

A measured amount of crude oil from the pipe line is pumped into a storage tank at each station for use as fuel by the engines. The crude oil usually contains sludge and foreign materials, some of which will settle out in the storage tank, but most of the impurities will stay in suspension because they are about the same specific gravity as the oil. The large pieces are removed as the crude is pumped through a jacketed Winslow filter which contains treated elements for removal of moisture, large, solid particles and for neutralizing dissolved sulphur compounds. The oil is then pumped by the Roper transfer pump to the water heated settling tank. This tank is heated because oil settles out its impurities faster and more completely when it is warmed to about 100° F. Oil, when mixed with water, tends to form an emulsion. When heated, the oil and water separate and the water will settle out since it is heavier than the oil.

The crude oil is then drawn from this settling tank by the fuel oil filter pump. From this point on it is possible to run the oil through any combination of oil treatment equipment by manipulating the proper valves in the system. The treatment required for the fuel will depend on the condition of the oil, and what is required to make it suitable for combustion and usable so it will not damage the finely made parts of the fuel pumps and injectors on the diesels.

One of the most important treatment units is the Sharples centrifuge and heater. This unit is used at all times when treating oil since it will remove both water and foreign particles which remain in the oil. From the centrifuge the crude goes to a second jacketed Winslow filter, which has treated elements of a much more dense construction. This second filter pass removes more moisture and some of the finer particles which could not be thrown out by the centrifuge. This second Winslow unit will, also, further neutralize acid formation if existent.

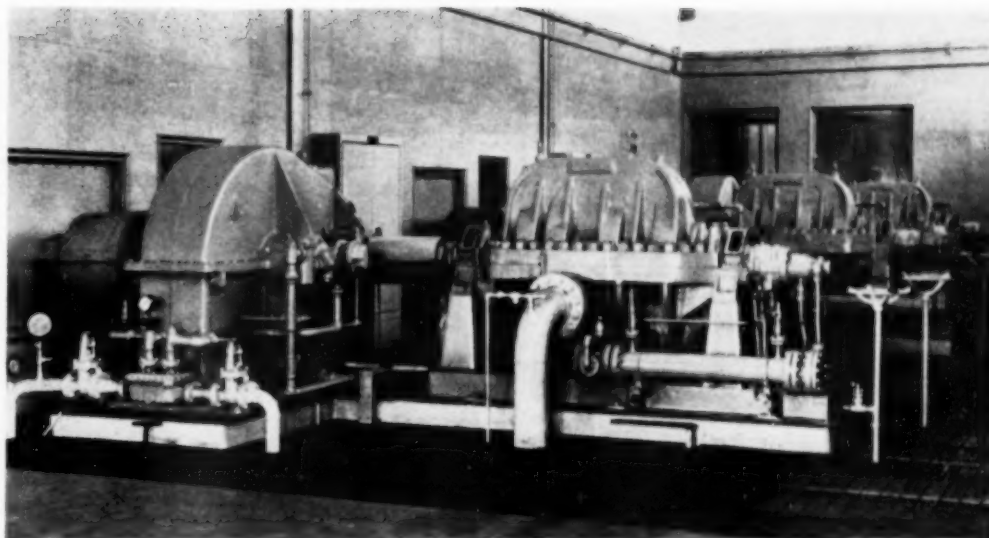
The crude now is pumped into the clean oil tank of operating tank which is set up in a recirculating system in such a manner that approximately five times engine consumption is continually recirculated at controlled temperatures through a jacketed Winslow filter. This filter is identical to the

Speed increasers with Thomas Flexible couplings driving Bingham pumps at Edmonton Station.

second Winslow filter in the primary stage and in its recirculating system further neutralizes acid, drops out moisture and removes finer particles.

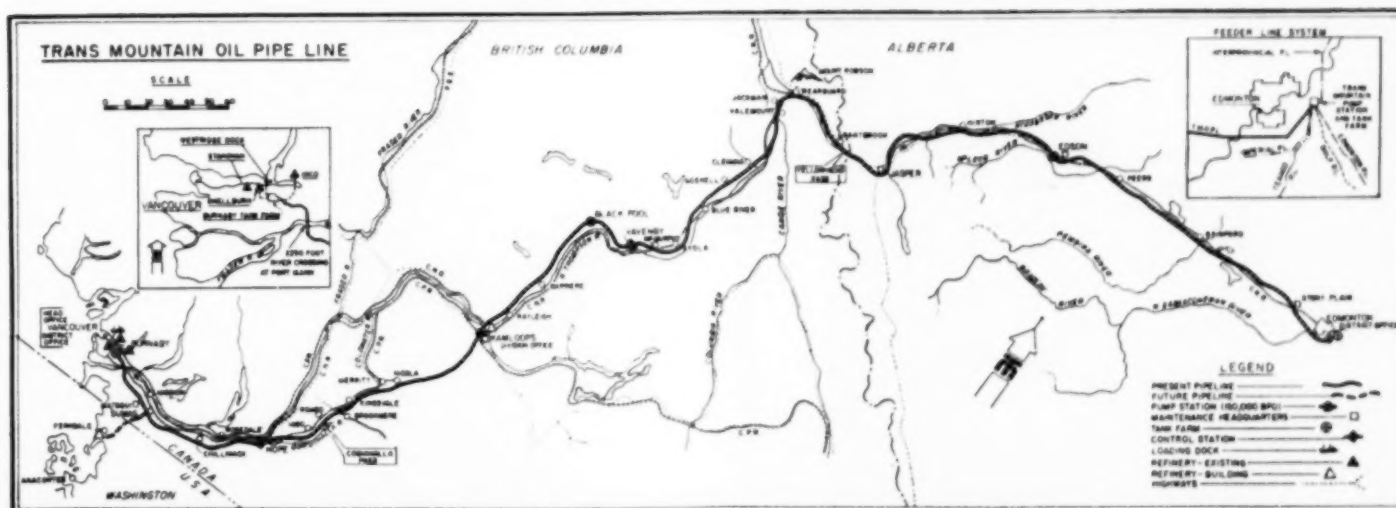
It has been found that control and recirculation of crude oil through chemically treated filters will supply to the engine a very satisfactory fuel. The treatment performs a function through neutralizing and absorbing of dissolved compounds and through the coalescing of finely dispersed moisture. The removal of these two products breaks the bond which might tend to form a colloidal or sludging action within these fuels. Naturally the removal of solid particles is a simple filtering process and does not cause serious concern. It will be noted in the preliminary treatment that the crude passes through first a coarse filtering medium, then a denser filtering medium in order to graduate separation of all contaminations and the system does not tend to prematurely plug the filtering media on the line, which might greatly shorten service periods. It might be noted at this time that each of the three Winslow crude oil filters installed in each of these three stations contains twenty-one treated elements, each one selected for the job assigned to it.

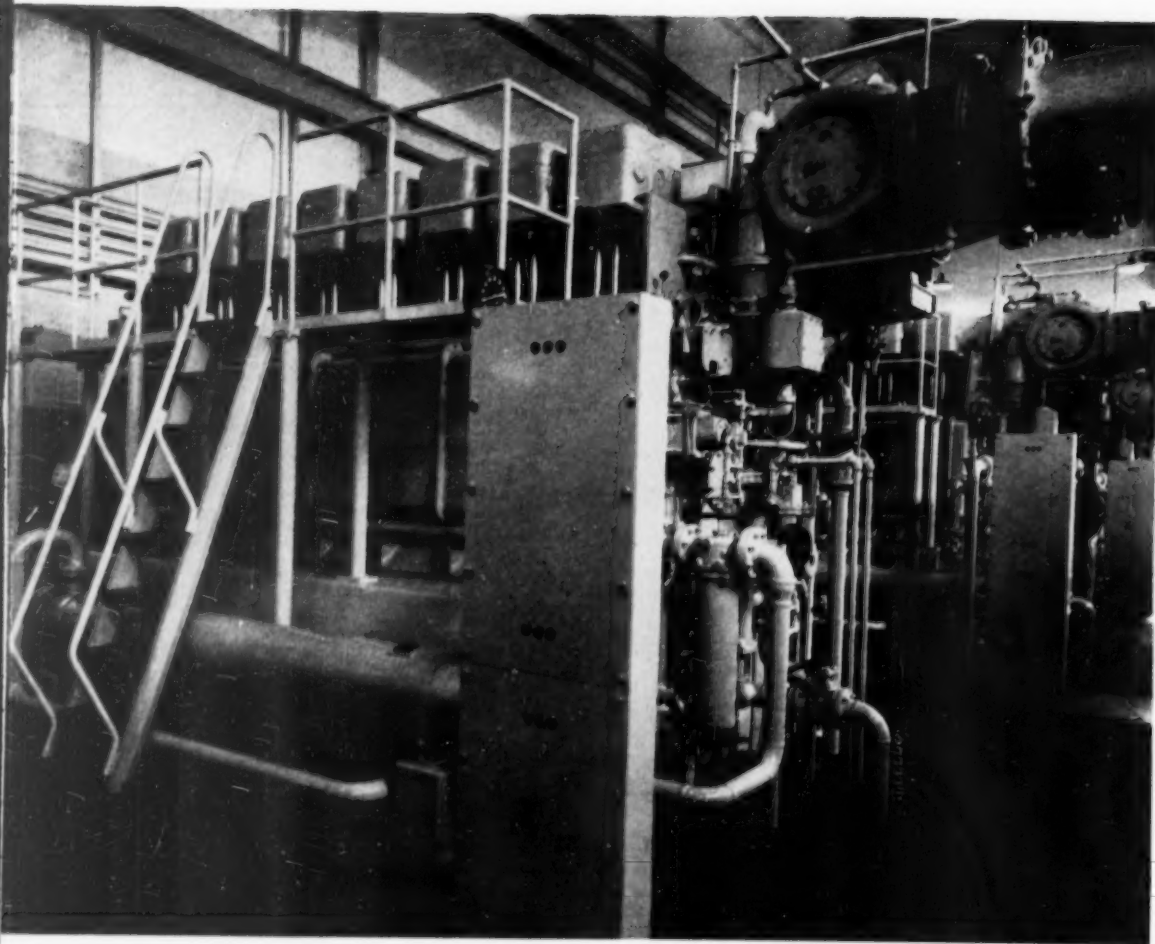
Getting back to the system again in detail, the crude passes, as we said before, to the clean oil tank where it is stored until it is to be used in the engines. It can also be pumped from the clean oil storage tank back to the settling tank for re-processing, if necessary. When the fuel goes to the engines it is removed from the clean oil tank by the Roper fuel oil circulating pump and is piped through a Rockwell meter to indicate the amount of oil supplied each engine. The fuel then



Rail crossing of the Trans Mountain pipeline in the rugged mountains.

The route of the Trans Mountain pipeline from Edmonton to Burnaby.





Another view of the Edmonton Station equipped with three Nordberg Supairthermal Dualfuel engines. Ross heat exchanger in foreground. Brown Boveri turbochargers.

Approach No. 4 crossing of the Fraser River west of Jasper showing weights in place.



goes to a common header where it is distributed to all of the Bendix Scintilla injection equipment, after first passing through a very fine Nugent duplex filter and, of course, the individual engine fuel oil booster pumps.

The Edmonton station, operating as it does on natural gas, doesn't require a lot of the equipment mentioned above, but its engine gas fuel system is interesting. From the Rockwell gas regulator which maintains a constant supply pressure to the engine, the gas passes through a meter, thence to a Fulton-Sylphon safety shut-off valve which is controlled by fuel oil pressure. From the shut-off valve, the gas passes through a control valve which is manually operated by the gas handle of the control gear located at the forward end of the engine. After passing through the control valve, the gas is directed through the gas supply header to the governor operated gas regulating valve located at the flywheel end of the engine. Gas from the regulating valve then enters the gas inlet header where the individual adjustable equalizing plug cock valves admit gas to their respective cylinder gas ports. The equalizing valves are used for cylinder balancing. From the gas port, gas is admitted to the cylinder combustion chamber through a poppet type gas admission valve which is hydraulically actuated from a gas cam on the camshaft.

There is a Fulton-Sylphon safety shut-off gas valve located in the station gas supply piping close to the engine and is of the double-seated, pressure-operated type. This valve is used to shut off the gas supply to the engine whenever the pilot fuel oil supply pressure falls below a pre-set value. In the event the fuel oil booster pump fails or the pilot fuel oil pressure fails for any other reason, gas fuel admitted to the engine cylinders will not be ignited by pilot oil. The unburned gas would then be exhausted into the hot exhaust system where combustion could be disastrous. Fuel oil is directed to the top of the shut-off valve where the pressure of oil moves the bellows to open the valve. The expansion of the bellows is also opposed by spring tension which may be adjusted to set a minimum fuel oil pressure required to open the valve.

The air inlet and exhaust system on the twelve Nordberg engines on this Trans Mountain Pipe Line have some interesting points. The air inlet and exhaust system consists of a Brown Boveri turbocharger, American Air Filter, Young Radiator air cooled air intake manifold, exhaust header and Maxim exhaust silencer. The system supplies clean, dry, cooled air to the engine cylinders in the proper amounts and pressure as required for efficient, complete combustion of the fuel charge at all engine loads, and also silently carries away the spent exhaust gases in a manner designed to recover much of their energy and heat content. It is interesting to note at this point that the Brown Boveri turbochargers on these twelve engines constitute the first appearance of this type of turbocharger on diesel engines of U.S.A. manufacture. A detailed description of the Brown Boveri turbocharger appears on page 223 of DIESEL ENGINE CATALOG, Volume 18.

All stations are equipped with Bingham centrifugal pumps, with Dominion Engineering speed increasers, Thomas flexible couplings at Edmonton and Kamloops and Falk flexible couplings at Edson and Black Pool. The speed increasers have a 1.0 to 7.6 ratio, with the exception of Edson where the ratio is 1.0 to 8.2.

Each station has two heating systems: (1) forced-circulation hot-water heating in the main pump house, and (2) gravity-return steam heating in the combination garage and fire-pump house. The water in the pump house system is heated either by exhaust-silencer waste heat boilers or auxiliary crude oil fired boilers of 1,000,000 Btu/hour capacity. Two of the Nordberg engines operating near full load will generate sufficient heat for the waste heat boilers to warm the pump house in the coldest weather. Operation of these boilers is automatic. However, under light engine loads in cold weather, the oil fired boiler, manually started, operates automatically through a time relay. The steam for each auxiliary building is generated in a diesel oil fired boiler operating at two psi. under automatic electric control.

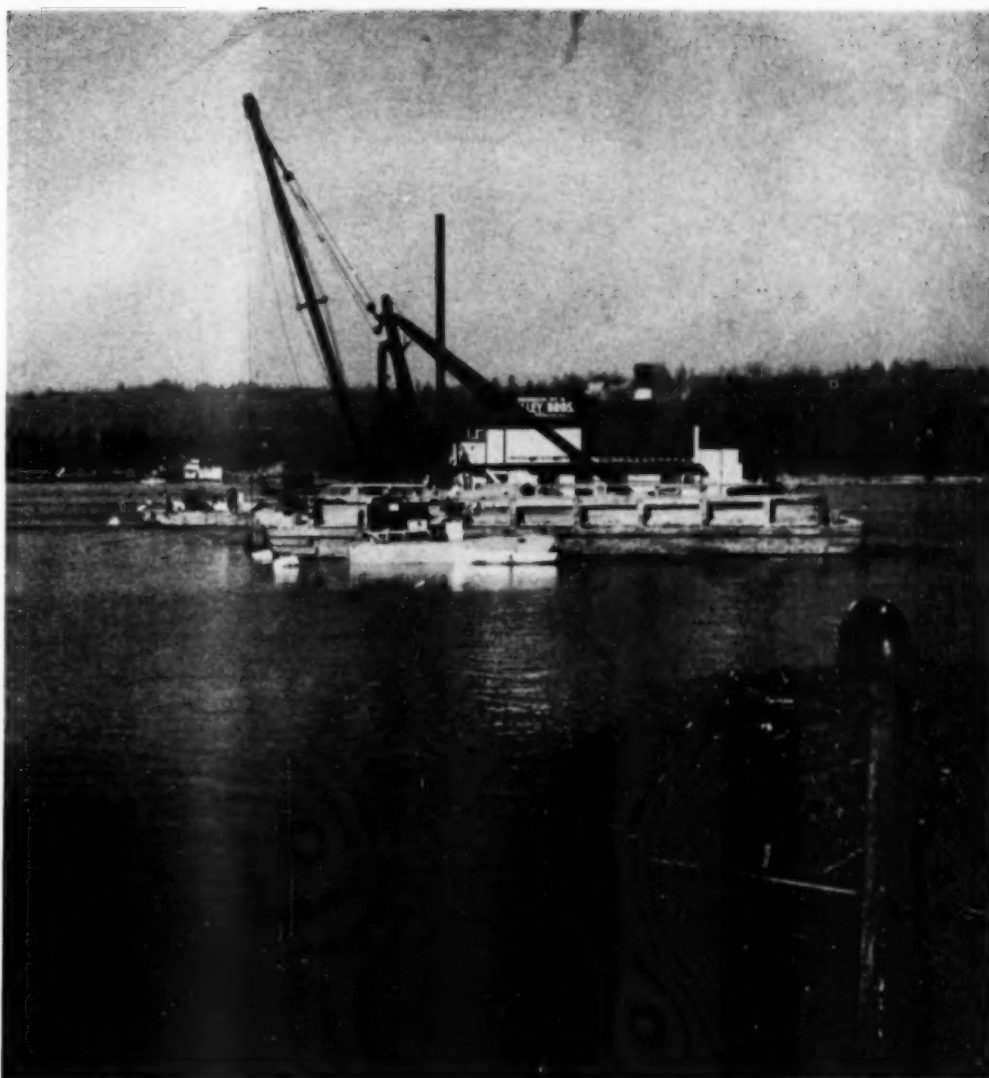
The first pressure-limiting station is located at Vavenby, which is 165 miles west and 2,100 feet lower than Yellowhead Pass. An automatic valve at Vavenby will shut to insure that static head downstream to the Thompson River crossing at Kamloops with an elevation of 1,120 feet will be reduced by 650 feet to a safe head of 2,160 feet.

The other pressure-relief station is located at Hope, about 30 miles west of the 3,760-foot summit of Coquihalla Pass. Here a battery of relief valves can spill oil into two 50,000-barrel tanks so that the pressure may be reduced to limits of safety in case of accidental closure of a valve against the main line flow.

Use of this pressure-limiting equipment saved about \$5,000,000 in the original line investment by avoiding need for heavier-wall pipe to withstand high pressures during accidental shut-offs in the low sections of the system.

The major oil fields in the Edmonton area are connected to Trans Mountain's eastern terminal by five gathering and feeder pipe lines of other carrier companies. These include lines of the Imperial Pipe Line Company Ltd. from Leduc, Golden Spike and Woodbend; Edmonton Pipe Line Company Ltd. from Joseph Lake, Armena and Camrose; Texaco Exploration Company from Wizard Lake and Bonnie Glen; Canadian Gulf Pipe Line Company from Duhamel, Malmo, Stettler, Fenn and Big Valley; and Interprovincial Pipe Line Company from Redwater and Excelsior.

The Edmonton terminal, situated on a 160-acre tract and subject to rigorous winter weather, contains eight 150,000-barrel and four 80,000-barrel steel cone-roof tanks. The western terminal at Burnaby near Vancouver is situated on a 200-acre tract at an elevation of 495-575 feet above tide-water on Burnaby "mountain." This terminal, in an area subject to milder storms, contains six 150,000-barrel and four 80,000-barrel steel floating-roof tanks. The numbers and capacities of terminal



Looking northward across the Fraser River from Port Mann, showing location of the Trans Mountain pipe crossing.

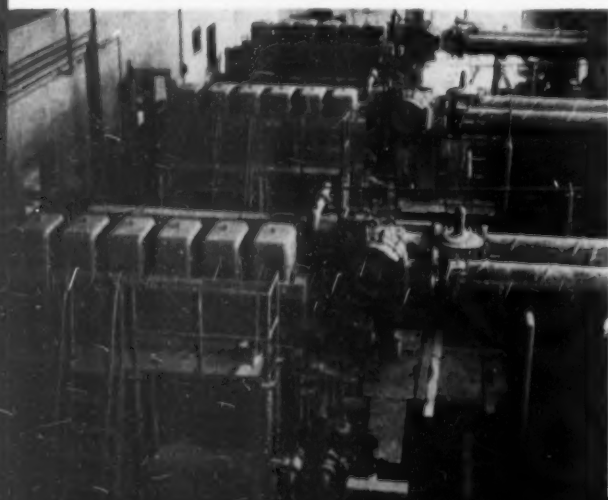


Steep going on this section of the mountain section of the pipeline.



Scraper trap on the Trans Mountain pipeline near Blue River, B. C.

The Nordberg engines at the Edson, Alberta, station. They are rated 1320 hp. at 500 rpm. Total horsepower of the four stations is 19,800.



tanks will permit the handling of at least three and possibly four types of crude oil. Those scheduled for receipts as initial line-fill are designated as "Redwater," "Light Mix" and "Leduc." The Burnaby terminal contains a special skimming sump to clean up tank bleedings.

The marine loading dock at Westridge on Burrard Inlet is fed by gravity flow from the Burnaby terminal through 21½ miles of 24-inch line. Local pipe lines have been privately constructed by Imperial Oil and Shell Oil to connect the tank manifold at Burnaby with their recently modernized and enlarged refineries on Burrard Inlet. Both can deliver 50-60,000 barrels daily under gravity flow. Standard Oil Company of British Columbia Ltd. has an-

nounced a proposed enlargement of its nearby Stanovan refinery, also on Burrard Inlet, and the construction of a private pipe line connecting it to the Burnaby terminal.

The intermediate pump stations on the Trans Mountain line are equipped with one or two 80,000-barrel tanks. It is contemplated that these tanks will be used only in emergencies.

At North Kamloops, British Columbia, a take-off has been provided to service the new 5,000-barrel daily capacity refinery being erected by Royalite Products Limited which is expected to go on stream in late 1953 or early 1954.

The marine loading dock at Westridge is an L-shaped structure, the main pier 275 feet long and the dockhead 150 feet long with 85-foot walkway extensions at each end. As initially constructed, the dock can accommodate one T2 or smaller tanker and several barges.

The 24-inch line from Burnaby to the dock will deliver up to 20,000 barrels per hour by gravity. A unique system of friction tubes in parallel is located on shore for control of flow rate. Adjacent are two 10,000-barrel cone-roof tanks for use in changing types of oil in the delivery line and a 50,000-barrel cone-roof tank and a sump for ballast water skimming. Also provided are the usual oil transfer lines, ballast discharge lines, a fresh water line from shore, fire protection facilities, telephone communications and a floodlighting system.

Provision has been made for delivery of oil by spur pipe line to the 35,000-barrel capacity plant of General Petroleum Corporation southwest of Ferndale, Washington. This plant is scheduled for completion in late 1954. A 24-inch spur is to take off from the main 24-inch line at Sumas Junction, about 70 miles east of Vancouver, and extend 51½ miles to the international boundary. During the spring of 1954, this 24-inch spur will be extended 15 miles to Laurel, Washington, with a 16-inch lateral 11 miles to the Ferndale plant. The total spur distance from Sumas Junction to Ferndale is 32 miles. Sufficient static head exists on the line from Coquihalla Pass to gravitate oil at a 200,000 barrel daily rate as far as the Seattle area, thus making installation of break-out tanks at Sumas Junction unnecessary.

The volumetric capacity of the 718 pipe miles of 24-inch main line is almost exactly 2,000,000 barrels. In preparing the system for operation, oil was pumped into the line to displace water at a rate of about 75,000 barrels daily, with interim shutdowns as required to accommodate the line completion and pressure testing program still in progress ahead. Rubber plug-type "pigs" or scrapers were run ahead of the oil and between each batch interface.

As a common carrier, Trans Mountain's tariff follows customary practice in the industry. For continuous shippers, the minimum tenders are 100,000 barrels in any 35-day period, with receipts and deliveries limited to 15,000-barrel minimum lots. Occasional or spot shipments of 50,000 barrels minimum will be accommodated, providing facili-

ties are available and the entire shipments can be received and delivered in single lots.

The tariff rate published initially for the trunk line movement from Edmonton to Burnaby is 45 cents per barrel delivered. The company undertakes to load tankers at its Westridge marine loading dock for 21½ cents per barrel. For the refiner shipping via the projected spur line into Ferndale, Washington, a through rate has been quoted from Edmonton of two cents per barrel above the Burnaby rate.

When the Trans Mountain Company was formed, a sum of about \$80,000,000 was obtained by sale of bonds and shares to cover the estimated cost of a two-station line of 75,000 barrels daily capacity extending from a then-proposed terminal at Acheson, Alta., to the terminal at Burnaby, British Columbia. After the decision was reached to originate the line 19 miles further east at East Edmonton, Alta., to raise the daily capacity to 150,000 barrels daily by adding two pump stations and increasing the numbers of pumps in original stations and the number of tanks in the two terminals, to build the marine loading dock in Vancouver Harbor and to build the spur line from Sumas Junction to the international boundary, the cost was raised to \$93,000,000. A review of actual costs indicates that the work originally projected was completed approximately within the original estimates. Completion of this important engineering work is certain to have a powerful influence upon the future economic development of Canada, not only by providing new markets for the expanding oil production of the prairie provinces, but also by stimulating the industrial growth of the territory it serves. It will attract manufacturing plants, provide the energy needed for utilization of the great natural resources of the area, and bring to western Canada the population which is the only factor lacking in its equipment for economic greatness.

List of Equipment for the Nordberg Diesels

Main Engine—Nine 8 cylinder Nordberg 1760 hp. and three Nordberg 6 cylinder 1320 hp. units.
 Turbochargers—Brown Boveri.
 Governor—Woodward.
 Air Compressor—Ingersoll-Rand.
 Flexible Couplings—Thomas and Falk.
 Fuel Oil Filters at Engine—Nugent.
 Fuel Oil Filters—Winslow.
 Fuel Oil Centrifuge—Sharples.
 Fuel Oil Transfer Pump—Roper.
 Fuel Oil Heater—Ross.
 Lube Oil Filters—Winslow.
 Lube Oil Filters on Turbocharger—Nugent.
 Lube Oil Transfer Pump—Viking.
 Lube Oil Clarifier—U. S. Hoffman.
 Lube Oil Cooler—Ross.
 Pyrometer—Alnor.
 Intake Air Filter—American Air Filter.
 Exhaust Silencer—Maxim.
 Exhaust Heat Exchanger—Maxim.
 Jacket Cooling System—Ross.
 Fuel Injection Equipment—Bendix Scintilla.
 Flexible Connections—Flexonics.
 Automatic Temperature Regulator—Fulton Sylphon.
 Gas Pressure Regulator—Rockwell-Pittsburgh.
 Gas Meter—Rockwell-Pittsburgh.

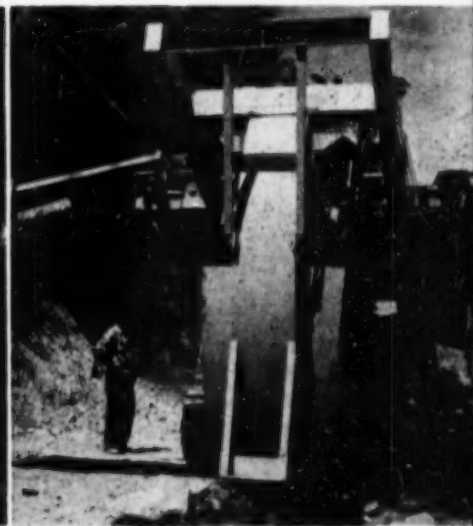
Gate valve installed 40 miles west of Edmonton.



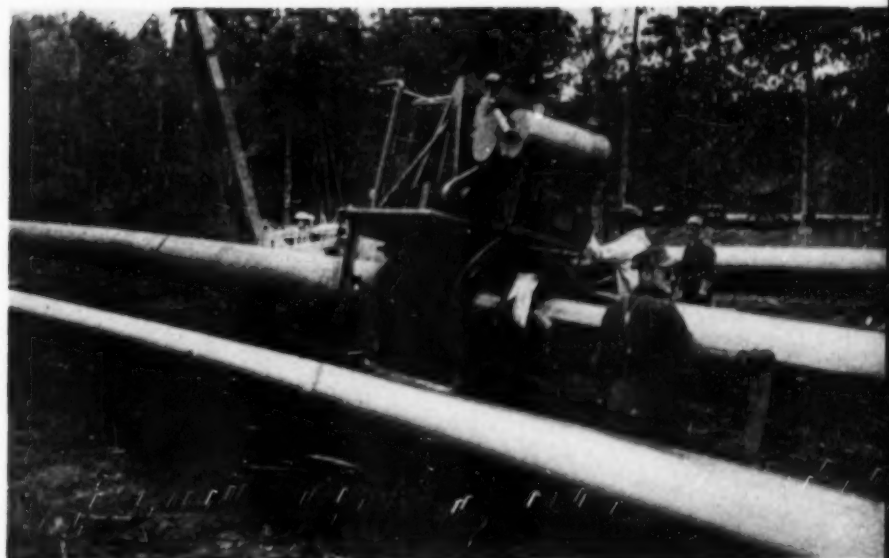
Each engine drives a Bingham 10 x 12 single-stage centrifugal pump through a Dominion speed increaser.



Ditching machine on right-of-way of Trans Mountain line between Vavenby and Avola, B. C.



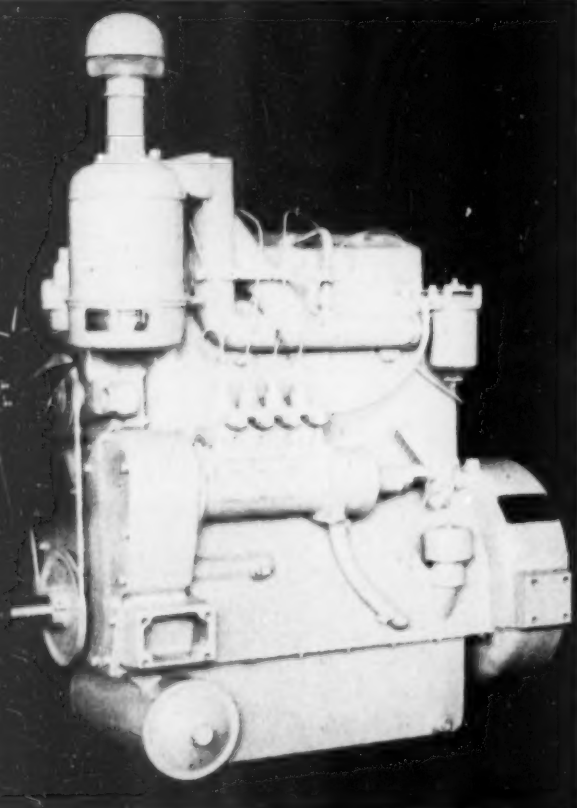
Clean and prime machine in operation near Duffield.



NEW SHEPPARD TRACTOR

By ORMOND O. BLACK

Sheppard diesel, model 16, which powers the new Sheppard Tractor. 318 cubic inch piston displacement.



IN November the R. H. Sheppard Company removed the wraps from its completely new-in-all-respects four-cylinder full diesel farm tractor. This unit has been in the developing and testing stage for some three years. It is sizeably bigger in most respects to the SD-2, SD-3 with which Sheppard pioneered the field of full diesel tractors in the farm market.

Of course the most important feature of the new SD-4 tractor is the power plant—the new Sheppard four-cylinder model 16 full diesel engine which is illustrated on these two pages. The model 16 was designed expressly for use with this tractor and represents Sheppard's eighteen years' work in the development of diesels for agriculture.

Those of you who are familiar with Sheppard engines will recognize the Sheppard mark of heavy-duty diesel construction in the use of main bearings between each throw and at each end of the crankshaft, oil spray cooled pistons, a heavy-weight flywheel and a super-sensitive fly-ball type gov-

ernor. Another of the more notable features of this engine is the use of full-flow filtration. Every drop of lubricating oil passes through the Fram filter before reaching the bearings. It guarantees that abrasive dirt which finds its way into the oil can't shorten bearing life.

The simplified Sheppard fuel injection system which has been described several times in the DIESEL ENGINE CATALOG and will be found on pages 180-181 of Volume 18, has been retained as an integral part of the new diesel.

It is claimed that when used the year around in all types of work the SD-4 will operate on an average of one and a half gallons of low-cost diesel fuel oil per hour. An all-new transmission, developed by Sheppard for use exclusively in the SD-4, offers the widest choice of ground speeds available in the farm tractor field. With ten speeds forward, this transmission provides the operator with complete versatility and flexibility of power to get the most out of the tractor and the implements.

The new Sheppard SD-4 diesel tractor is intended for the farmer who wants to use this machine the year around for all types of work.

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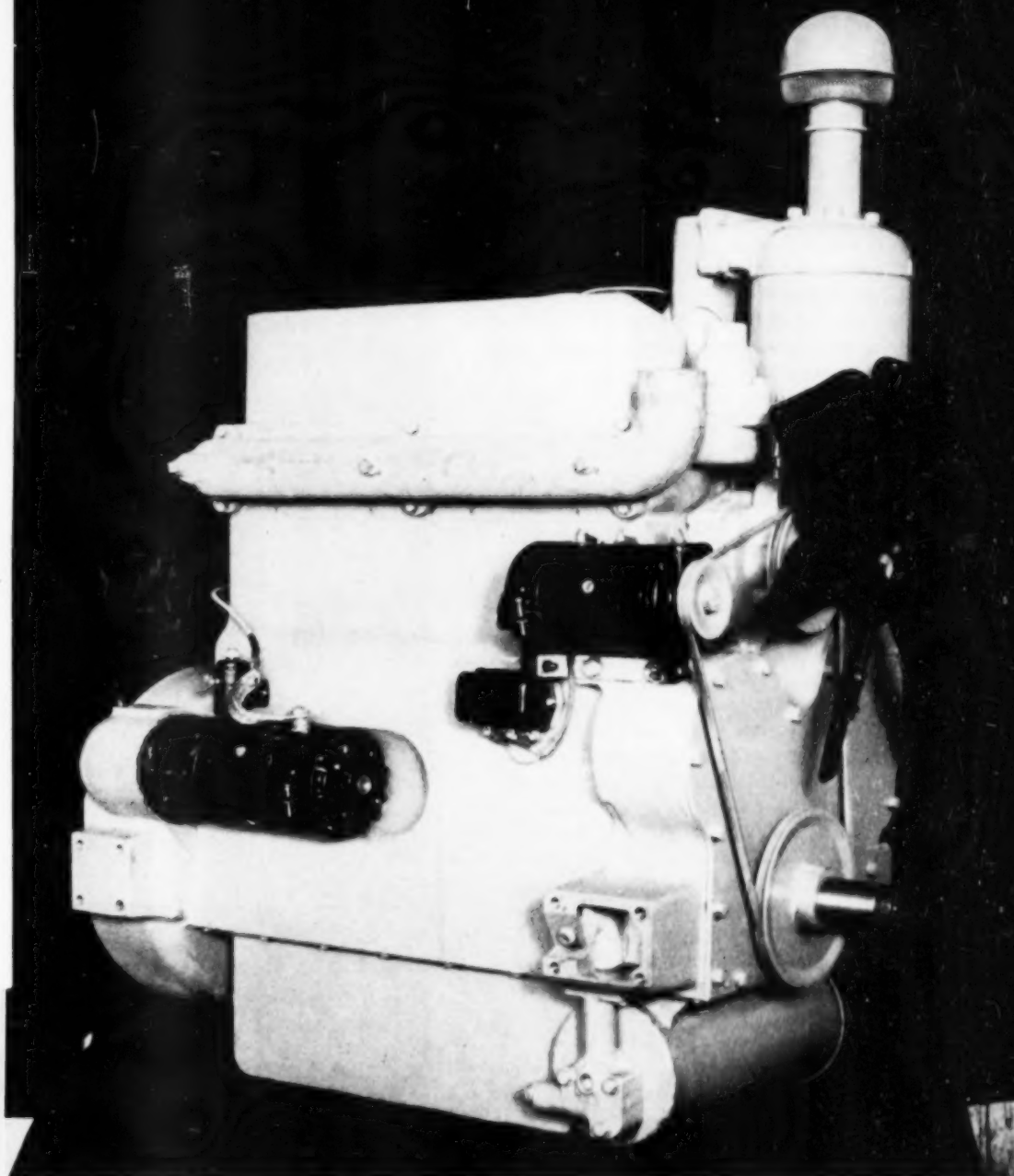
With less difference between gears, this ten speed transmission assures a more accurate "fit" for each operation and for varying soil conditions. This makes it possible to use a higher "in-between" gear, thus gaining greater speeds on many jobs. Two extra slow ground speeds are maintained for combining and harvesting. When travelling at less than two mph. even the heaviest crop will seldom clog or bog the combine or harvester pulled by this new Sheppard tractor.

Since Sheppard diesels were one of the first to provide big double disc brakes, an independent power take off, an independent hydraulic system, a fully adjustable hydraulic seat plus a heavy-duty simplified full diesel engine in a single tractor, it's only natural that these same features are found as the basic features of the new SD-4.

The principal accessories used on the new engine are as follows: Starting motor, battery charging generator and electrical equipment manufactured by Auto-Lite, a 12-volt system; a Donaldson oil bath air cleaner; Fram full-flow lubricating oil filter, cartridge type, built in integrally with the engine pan; Fulton-Sylphon thermostat; Yates-American radiators; Air-Maze crankcase breather; Fram fuel filter and a Rockford clutch.

Model 16 Sheppard diesel, bore 4½ inch, stroke 5 inch, 4 cylinders, showing Auto-Lite starting equipment and Fram full-flow lube filter in the base.

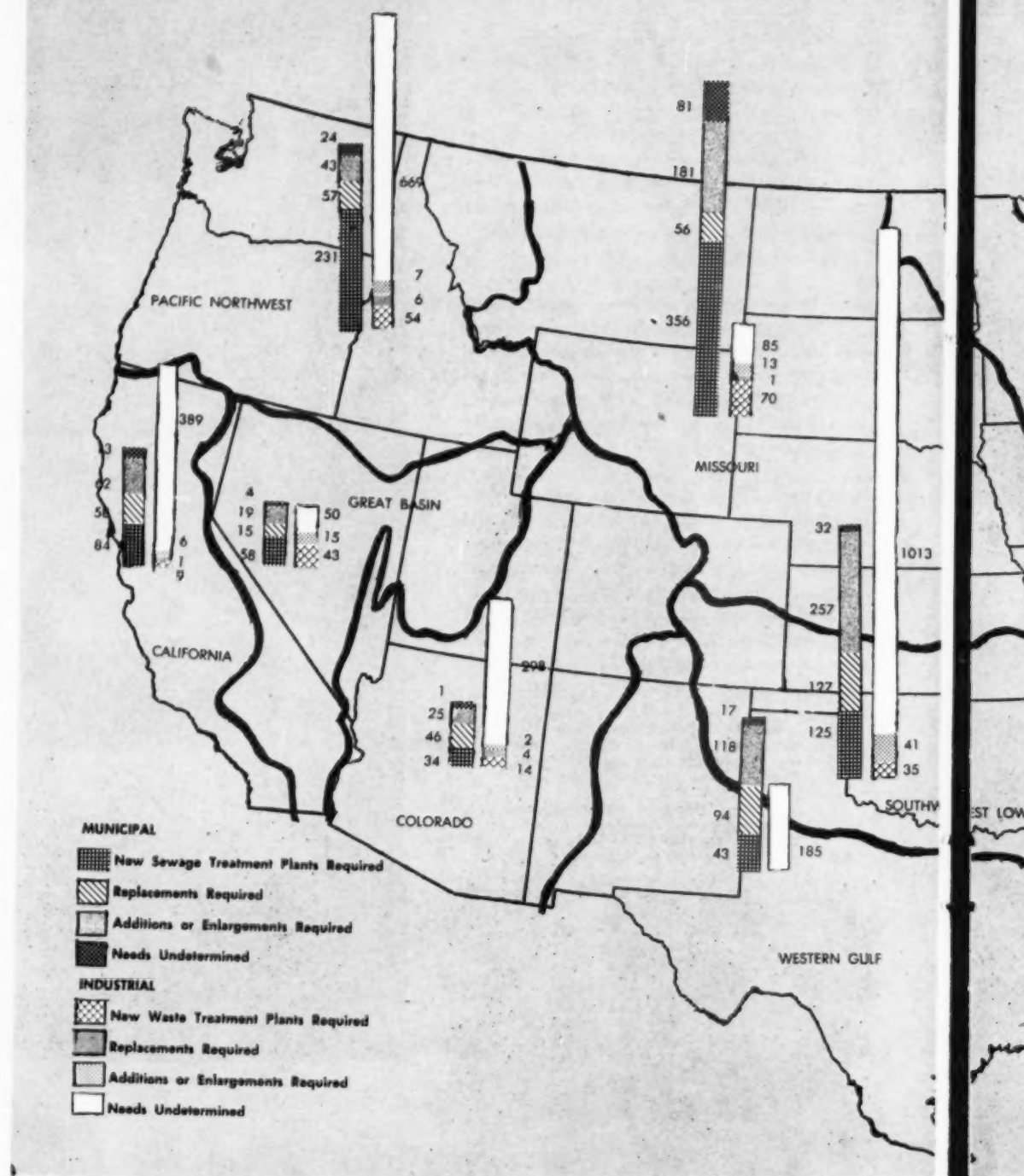
The new Sheppard diesel tractor brings a row crop versatility to a power class formerly limited to large single-purpose machines.



SINCE 1945 the horsepower in gas and dual-fuel engines going into America's sewage treatment plants has more than doubled. In the light of the long-range boom now going on in sewage and waste treatment and the changing concepts of the treatment needed to clean our water for public and industrial use, the diesel industry has increasingly important contributions to make to the solution of one of the nation's great problems. In a field where financing is a sore problem, the diesel industry offers substantial operating savings by converting gas, a by-product of sewage digestion, into power and heat needed to operate the treatment plant and effect digestion of the organic waste. A number of factors contribute to the seriousness of today's sewage problem and the size and complexity of its solution. There is the continuing movement of the population into urban centers so that today 65% is urban, 35% rural.

There is a further concentration of this urban population; nearly half of our population is crowded on 1½% of our land surface. On the industrial side, our country's production has risen over 700% since 1900 and more than half of the gain has been within the last 10 years. The United States Public Health Service estimates that this combination of population concentration and industrial growth has created 22,000 sources of pollution in the United States. As of the end of 1952 there were in the neighborhood of but 11,000 treatment plants—8,000 municipal and 3,000 industrial—to fight this contamination of our waters. Round figures are used in totaling present facilities because an exact count of construction is not available for 1950 and 1951 and an estimate must be made based on dollar expenditures for these two years. There are no industry figures on the number of gas and dual-fuel engines presently in use in the 8,000 municipal sewage plants converting a by-product of waste treatment, gas, into power. Informed guesses put such engines sales in the neighborhood of 150. The percentage of plants to which the diesel industry has sold generating units in the past is, however, no true measure of the market. As of the beginning of 1950 the Public Health Service estimated that 40%, or 2,541, of the municipal treatment plants then in operation were inadequate. Inadequacy, obsolescence and total lack of facilities added up to a need for 6,600 new municipal sewage plants and additions at the beginning of 1950. There were additional undetermined needs for another 1,600 municipal treatment plants. A higher percentage of these needed plants can be expected to afford complete secondary sewage treatment judging by the pattern of construction in the years since World War II. Gas is a by-product of both primary and secondary sewage treatment, produced in the digestion (or the reduction in bulk) of the organic wastes removed from the raw sewage. Primary treatment—the mere running of waste waters through sedimentation tanks—settles out about 35% of the bulk waste.

Secondary treatment removes up to 85% of this organic bulk and also most of the dissolved waste. This complete treatment which produces more sewage gas also requires more power to operate the necessary additional equipment. The staggering pollution problem presented by today's concentration of population in urban centers and mush-



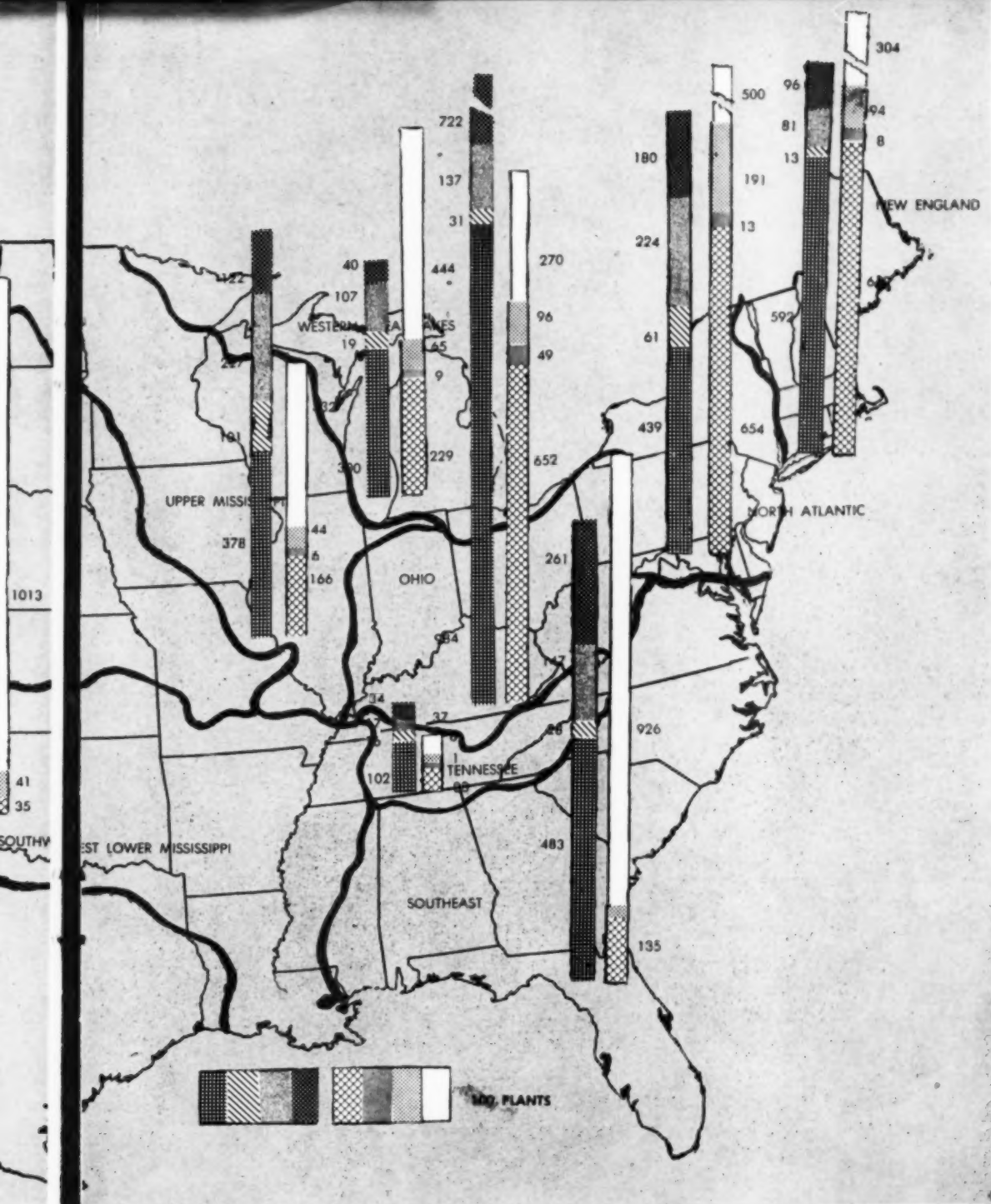
Without exception, every major river drainage basin in the country requires the construction of new industrial and municipal waste treatment plants, replacements, enlargements or additions. This is readily apparent from information received on known needs, apart from the large number of additional needs not yet determined.

URGENT NEED FOR MORE

By WILLIAM H. GOTTLIEB

GOALS: NATIONAL TOTALS

MUNICIPAL		
	Number	To Serve This Population
New sewage treatment plants	4,209	31,010,200
Replacements	722	3,508,400
Additions or enlargements	1,645	25,699,700
Undetermined	1,627	



This map contains statistics made available to us by the U. S. Department of Health, Education and Welfare-Public Health Service.

SEWAGE DISPOSAL PLANTS

The First of Three Articles on This Subject

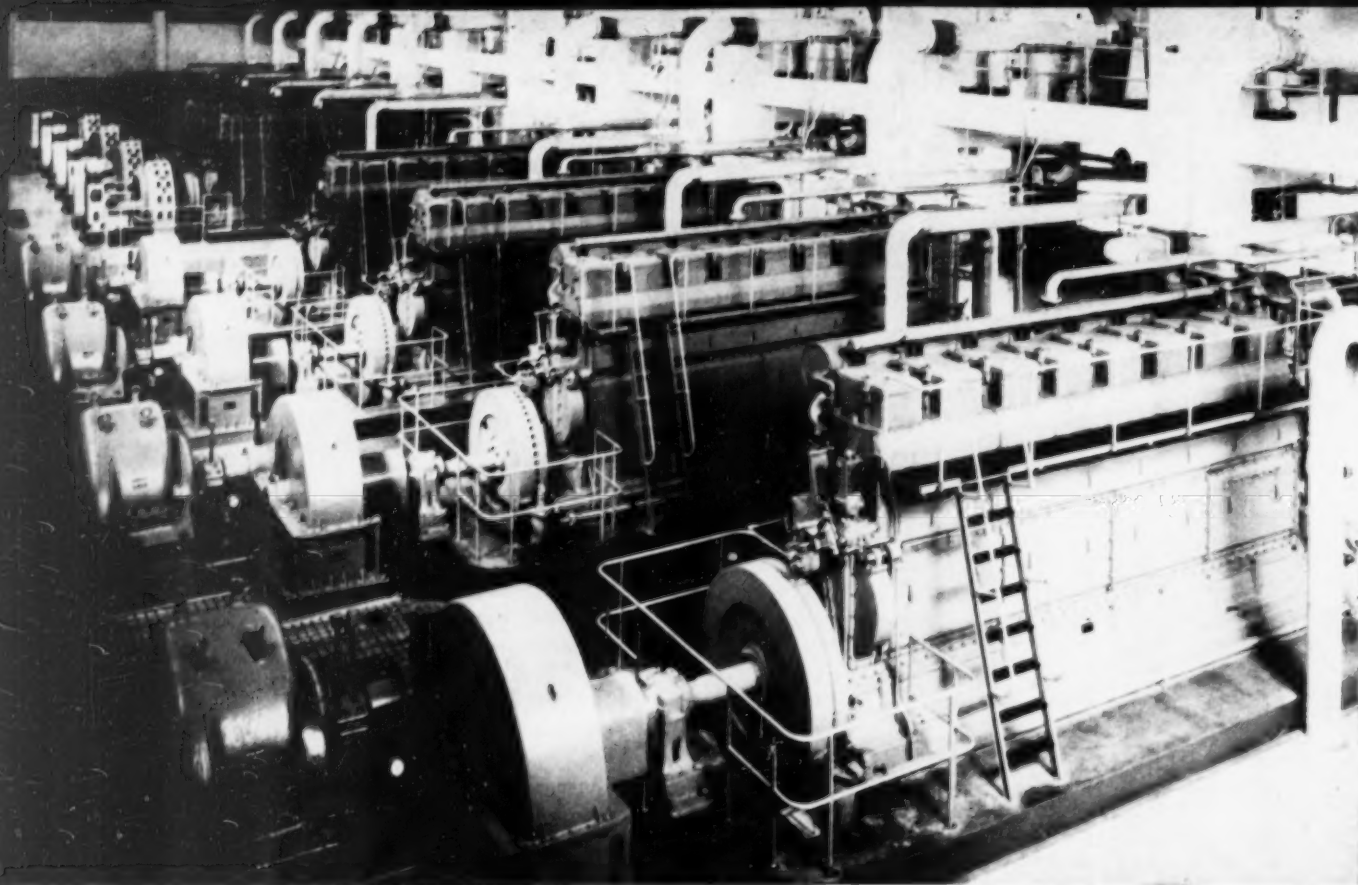
INDUSTRIAL		
	Number	To Serve This Population
New waste treatment plants	2,793
Replacements	98
Additions or enlargements	591
Undetermined	5,532

JANUARY 1954

rooming industrialization is not alone a matter of wastes discharged but of water consumed. City dwellers use more water. City grime alone makes for more frequent washing of clothes, linens. The daily bath is a must. Suburban gardens and lawns are a further drain. And all this water must come from a relatively few sources—in great part streams and rivers. Industry's demands are even greater. Approximately 1,000 gal. of water are necessary for the production of a dollar's worth of steel, nearly 2,000 gal. for a dollar's worth of paper. There are employee needs too. And, to such industries as soft drinks, drugs, it is not alone volume but quality of water that counts. When it was but the question of scattered farms and industries discharging their limited waste into rivers and streams, nature was able to absorb the pollution. Fishes, insects, plants and bacteria in waterways and in sewage itself feed on waste and, in time, "eat up" the organic portions. So long as this underwater life can get the oxygen it needs to live, a stream or river can take care of pollution. But let the discharge of sewage become heavy and even a major river is so clogged that its oxygen supply becomes too meager to keep underwater life alive. Then there is no chance of the pollution being absorbed without nuisance.

Today not only is the volume of sewage heavy but there is less water to handle it due to the mounting water supply demands of the public and industry. The poisonous waste then sweeps on downstream to the next urban center and the next industry in need of good, pure water not alone for its social life but for its business survival. Water treatment does not solve the problem. It takes no account of what untreated waste can do to our recreational facilities—swimming, boating, hunting, fishing—and agriculture and fishing industries.

A sewage treatment plant removes the bulk of the solid matter in domestic waste and most of the dissolved matter—varying according to the design. Treatment speeds up natural action so that the fluid discharged from the sewer outfall requires a great deal less natural decay. Thus the watercourse is not burdened with waste beyond its limits and remains suitable for the social and working uses required of it. It is estimated that an annual rate of expenditure by municipalities of from 400 to 450 million dollars over the next 10 years is the minimum needed to bring this phase of the nation's pollution problem under control. In 1952, contracts totaling \$137 million were awarded for new plants, additions and improvements; for 1953 contracts are expected to hit a peak of between \$200 and \$250 million. There is a known municipal backlog of \$2½ billion and an estimated obsolescence and expansion need during the next 10 years of \$2 billion. With pollution tied so closely to water resources the problem is being attacked today by local, state, federal and interstate agencies on the basis of geographic river basins. There are 14 of such natural basin areas in the United States, all with problems of waste disposal. A 1950 Public Health Service survey of 11 major river valleys representative of the country as a whole brought forth the facts that 1) even though not all streams are polluted, our major streams, nationwide, are gravely affected and 2) pollution is a factor that already affects or eventually will affect



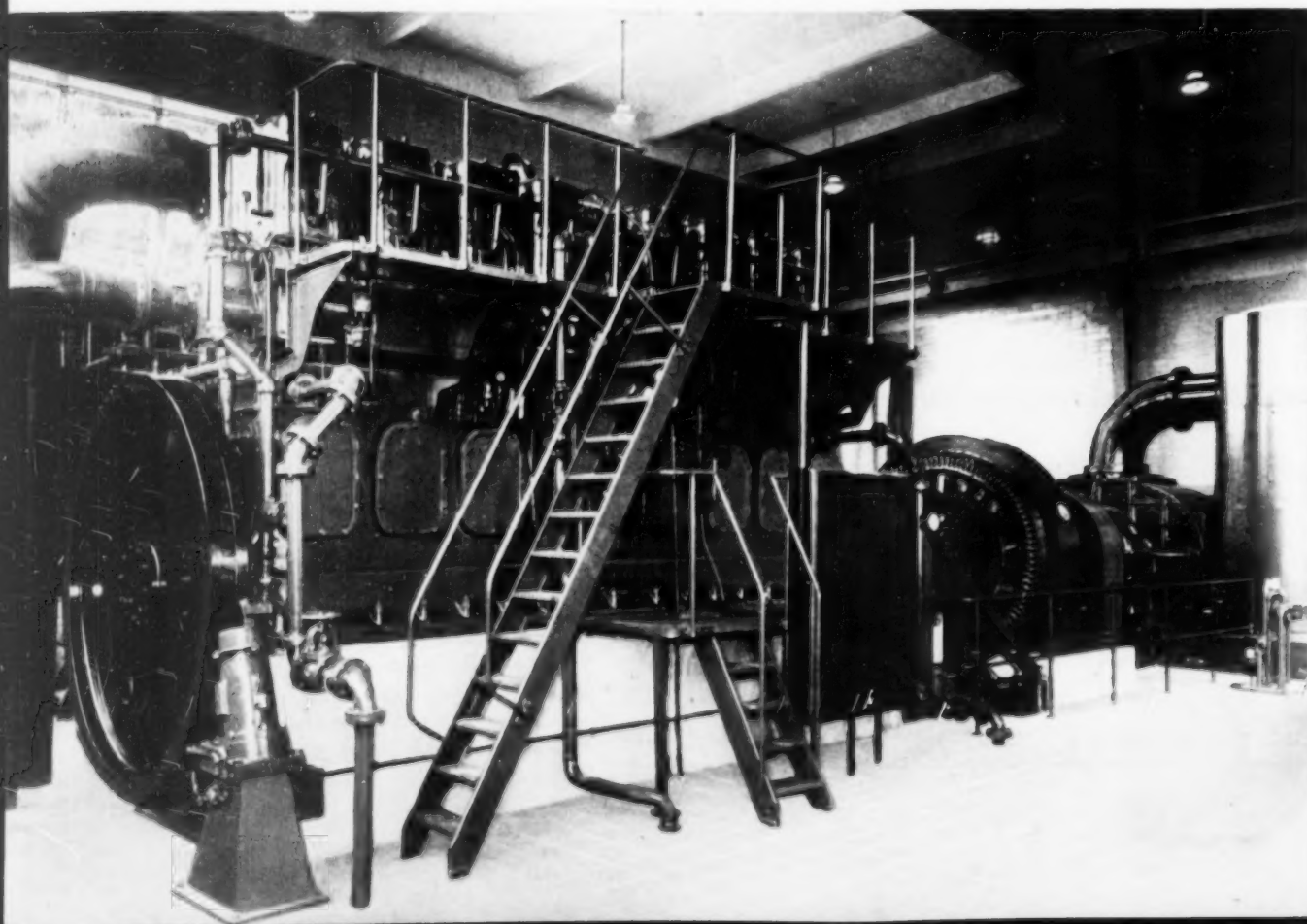
Nine 1,688 hp. dual-fuel supercharged Worthington engines are installed in the Hyperion Activated Sludge Plant in Los Angeles, California, the largest sewage disposal plant of its type in the world.

all water resources development whether it be flood control, irrigation, hydroelectric power, municipal and industrial use, or recreation. The survey further revealed a preponderance of pollution in the heavily populated, highly industrialized East and Midwest. Four of the river basins (the Connecticut, Delaware, Potomac and Ohio Rivers) have 4,722 cities and factories, or more than 67% of the total of the 11 basins studied. Nearly two-thirds—in the neighborhood of 3,148—of these cities and factories discharge their wastes wholly untreated. In estimating the diesel industry's potential market in the sewage treatment field, sources of indus-

trial pollution must be discounted because of the character of much of the factory waste. Population of a municipality is another important consideration. The Public Health Service tabulated, as of the beginning of 1950, the following municipal sewage treatment needs for the Eastern and Midwestern United States.

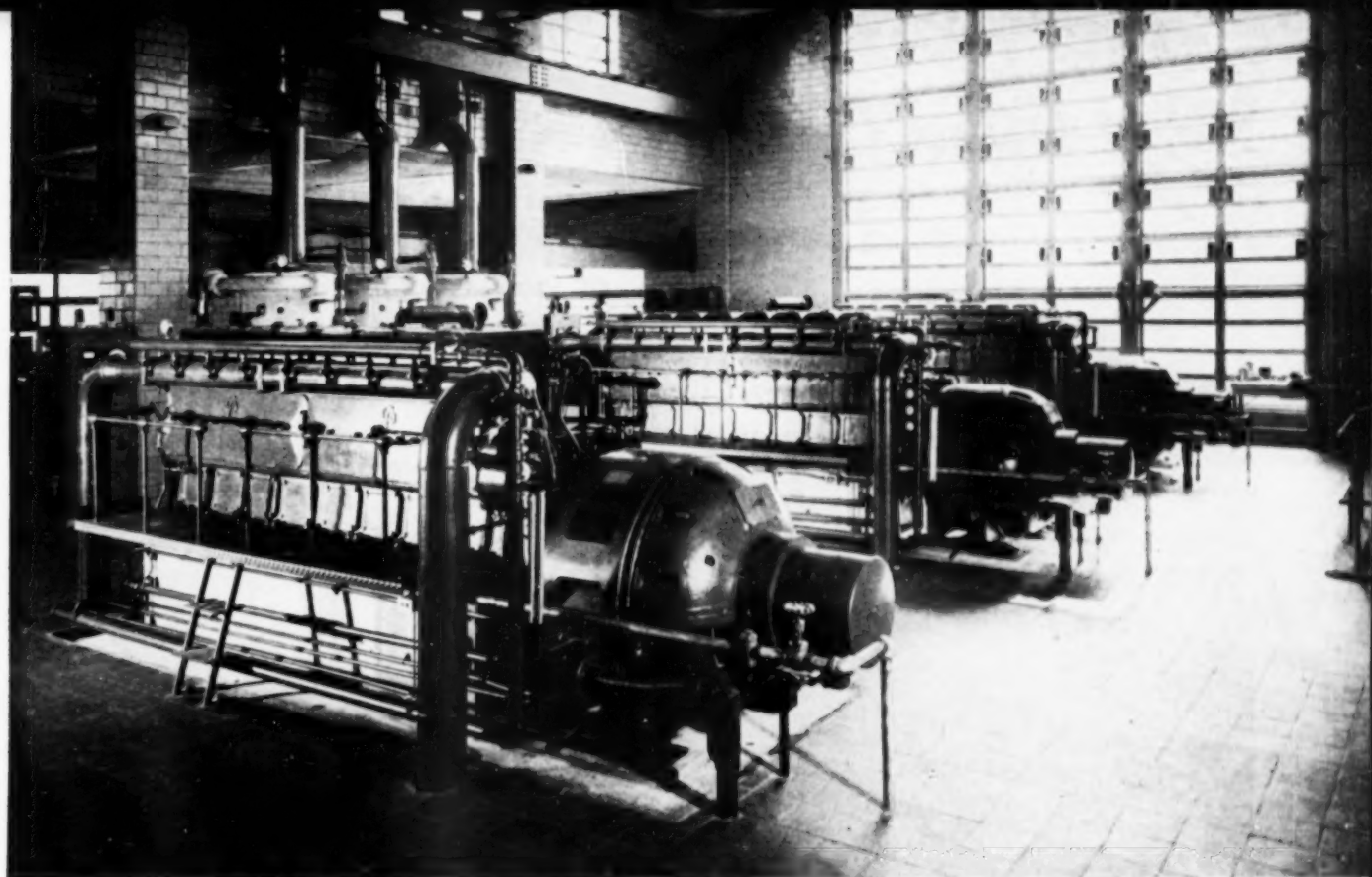
	New Plants	Replace- ments	Additions or Enlarge- ments	Needs Unde- termined	Total
New England	592	13	81	96	782
No. Atlantic	439	61	224	180	904
Southeast	483	28	147	261	919
Ohio	984	31	137	722	1874

Today, a number of states have laws requiring communities to treat their sewage. While Federal and State agencies have been rendering technical assistance to communities in this fight on pollution, the financial responsibility rests upon the local residents. Recognizing the extra burden this places on a public already faced with higher taxes and living costs, Carl E. Schwob, Chief, Division of Water Pollution Control, Public Health Service, has stated that "we need to develop improved and cheaper sewage treatment methods . . . to reduce the cost of this public service if it is possible to do so." The use of gas, by-product of sewage digestion,



Four 900 hp. Cooper-Bessmer gas diesels, all identical to the unit pictured here, power New York City's Hunts Point Sewage Plant.

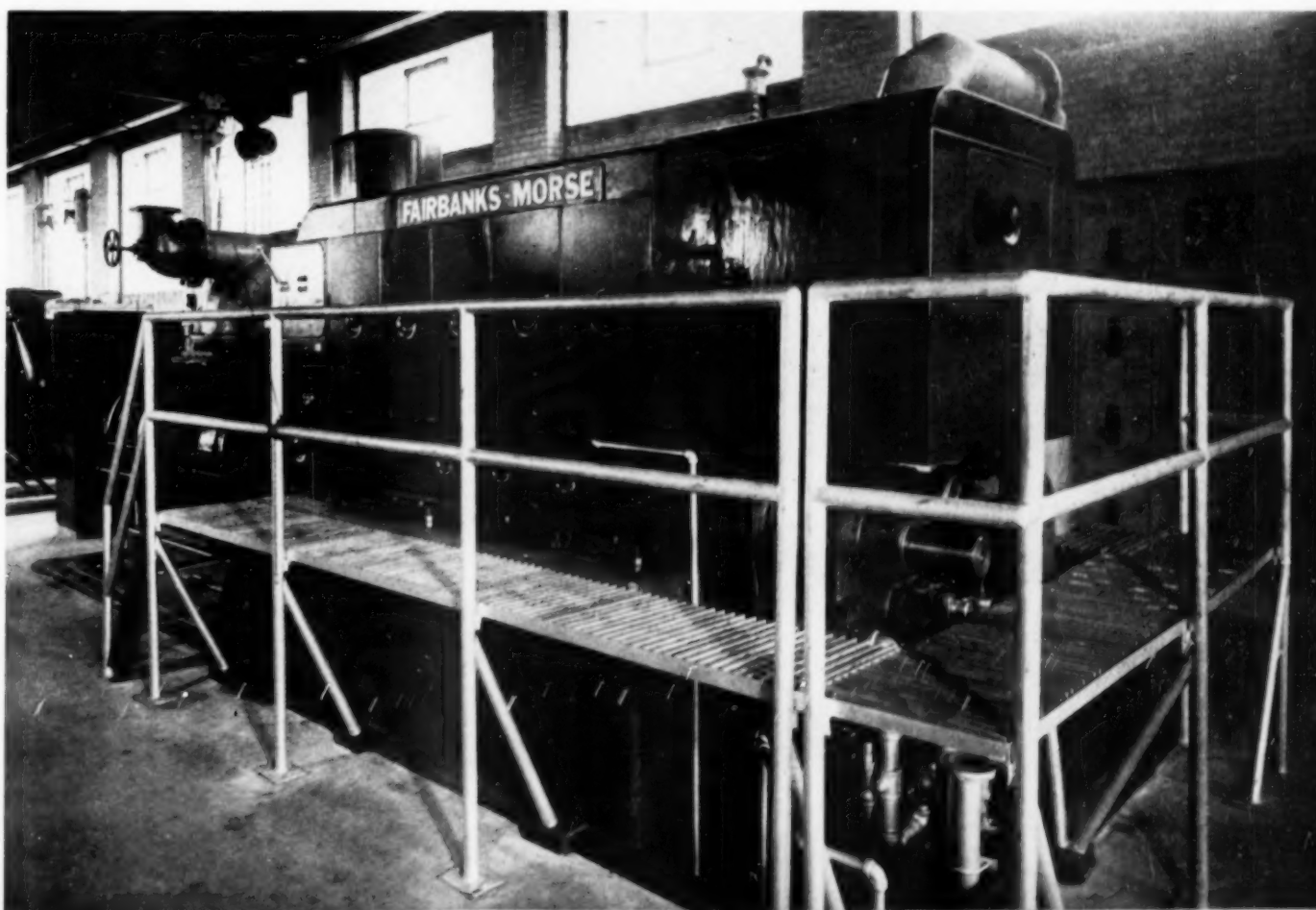
Power is supplied for New York City's Rockaway Sewage Treatment Works by three 306.5 hp. dual-fuel Chicago Pneumatic engines.



as fuel for engines to supply the power and heat necessary for full waste treatment is one avenue to reduction in operating costs. It has been stated that there are three "musts" for a sewage engine—dependability, flexibility and economy. The need for dependability is obvious since waste disposal is a 24 hour a day, 365 days a year job and interruptions are not only annoying and expensive but can be dangerous. Both gas and dual-fuel engines afford this protection. In the case of gas engines, alternate sources of gas fuel can insure against shortage of sewage gas with which to run the units. Dual-fuel engines will switch automatically to fuel

oil should sewage gas run low. Beyond assurance of flexibility so far as operating fuel is concerned, both gas and dual-fuel engines can be operated at variable speed to accommodate the changing flow through a sewage plant during a 24-hour cycle and at different constant speeds to drive blowers. There is really a double economy in the use of gas and dual-fuel engines for sewage treatment. Not only is a by-product of sewage treatment—gas—converted into useful power but, at the same time, the engines developing this power furnish their own by-product—heat recovered from jacket water and exhaust gas—for use in further processing the

sewage. Spark ignition gas engines are usually specified for use in plants of a size to insure a full supply of sewage gas. Dual-fuel units are to be found where there is a need or desire to supplement sewage gas to insure steady uninterrupted power. On the one hand, a treatment plant may elect to install engine horsepower to meet all power requirements though not enough gas is produced to fully power the units. On the other hand, engine horsepower may be installed to meet future needs though at the moment not enough gas is being produced to run the units on gas alone. This is the first of a series of articles.



One of the two identical 325 hp. dual-fuel Fairbanks-Morse engines installed in the enlarged Lansing, Michigan, sewage plant.

NEW PRECISION IN SETTING VALVE "GAPS"

A New Principle in Setting Valve Clearances on Overhead Valves Assures A High Degree of Accuracy

A new precision instrument utilizes an entirely new principle in setting valve clearance, or "gap," on engines with overhead valves. It measures the travel of the valve rocker arm prior to contact with the valve stem. This measurement is

transmitted to a dial indicator gauge graduated in thousandths of an inch. The easy-to-read dial permits a positive, visual setting of valve clearance regardless of wear or pitting of the valve rocker arm. Hydraulic valve lifters can also be visually

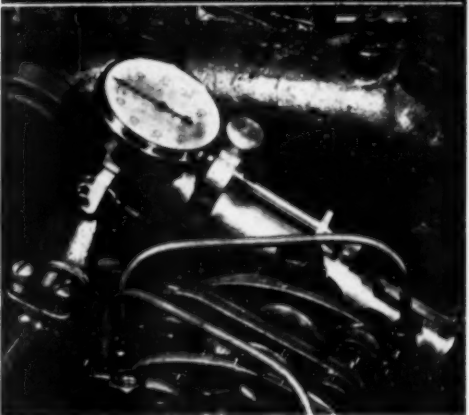
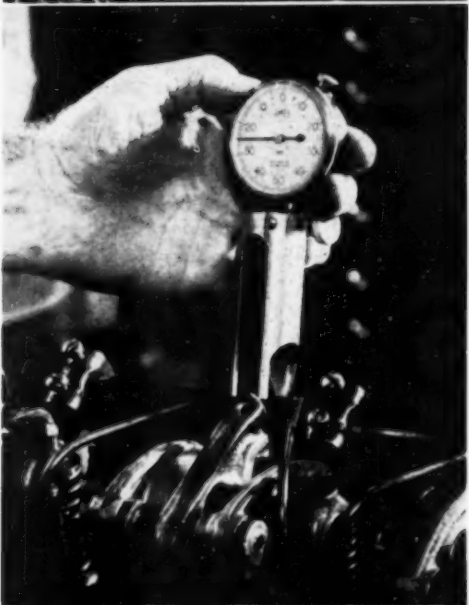
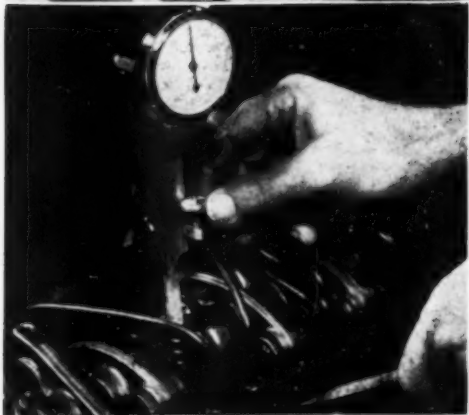
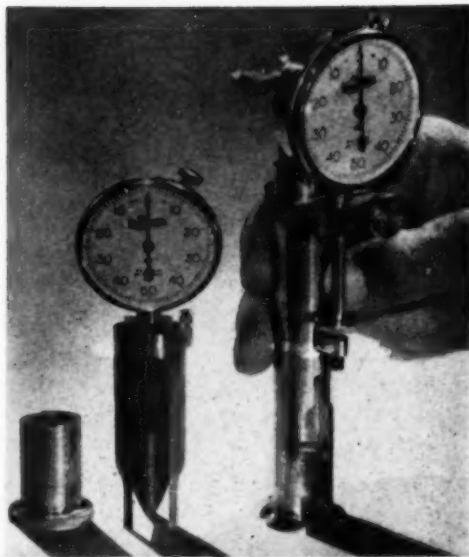
checked with this instrument. The unit is placed on the valve rocker arm and with the engine running, the smallest gap will register and be as obvious to the car owner as the skilled mechanic.

The P & G Valve-Gapper, Model 201-A, is the injector timing attachment for GM-71 series diesel engines. With this precision tool, mechanic can time injectors visually with micrometer accuracy. A micrometer plug gauge which is machined with left half for 70 mm, 80 mm and 90 mm injectors, the right half for 60 mm injectors. This plug gauge is inserted in the timing tool with the proper mm setting against the rack of the dial indicator. Then the needle is set to zero by turning the dial. This is the first step of the injector timing operation.



Models are now available for most gas and diesel engines with overhead valves. A special model designed for General Motors diesel engines has a triple use. In addition to setting valve gap, this model permits perfect, visual timing of injectors, and balancing of the fuel injector racks by engine operators as well as skilled mechanics. The dial indicator shows the most minute variations in settings. In setting valve gap, the unit is quickly positioned on the valve rocker arm with the base resting on the valve keeper, and the movable bracket hooked securely on the edges of the valve rocker arm. As the rocker arm moves toward the valve stem, the bracket moves with it until contact is made. This movement is registered on the dial indicator. As soon as the rocker arm contacts the valve stem, the entire tool moves downward with the valve. The only movement registered is that of the rocker arm prior to contact with the valve stem.

In addition to micrometer-accurate settings, the instrument leaves both hands free to handle adjusting tools thereby saving considerable time for the operation. Timing injectors on GM diesel engines with the unit is a simple matter of placing the timing attachment over the injector and adjusting the timing to the desired setting. The base of the tool rests solidly on the injector body while the dial indicator rack rests on the top surface of the plunger follower guide. Both hands are free to handle adjusting tools with the dial registering the exact setting. Balancing the fuel injector racks is equally simple. The No. 1 injector rack is set to the governor in the normal manner. The instrument is then positioned between the injector control tube link pin and the cylinder head rim, and the dial adjusted to zero. Spring tension holds the tool in place and the No. 1 rack in full bottom position. Any change in the position of the No. 1 rack will register on the dial indicator. As the adjusting screw on each following injector rack is turned, the dial will indicate when the rack is bottomed, as any adjustment past this point will back off the No. 1 rack and change the dial reading. After each rack is adjusted in this manner, all rack settings are perfectly matched to No. 1. The advantages of the unit are obvious—accurate settings can be made visually without any dependence on individual "feel." This enables any mechanic or engine operator to make the most perfect settings possible in far less time than heretofore. Manufactured by the P & G Manufacturing Company, the unit is available immediately through automotive jobbers or the manufacturer. For full information address File 112, DIESEL PROGRESS, P.O. Box 8458, Cole Station, Los Angeles 46, Calif.



Shown here is the Model 201 P & G Valve-Gapper set for use on GM-71 series diesel engines. The set includes: (left) the micrometer plug gauge, (center) injector timing attachment with dial indicator in place, and (right) the basic tool for setting valve gap and balancing the fuel injector racks on GM-71 series diesel engines. The micrometer plug gauge is machined with left half for 70mm, 80mm and 90mm injectors, the right half for 60mm injectors.

VALVE-GAPPING

New Valve-Gapper, Model 201 designed for GM-71 series diesel engines, is easy to use. First operation in making micrometer reading to adjust gap is to place tool on rocker arm.

After positioning Valve-Gapper, the valve gap is closed and the micrometer dial is adjusted to zero. Operation takes only seconds.

To adjust valve gap, both hands are free to make adjustment while mechanic reads micrometer dial. When manufacturer's specified gap shows on dial, gap is set to micrometer accuracy.

TIMING

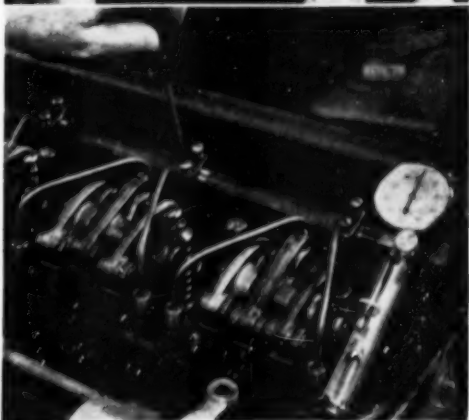
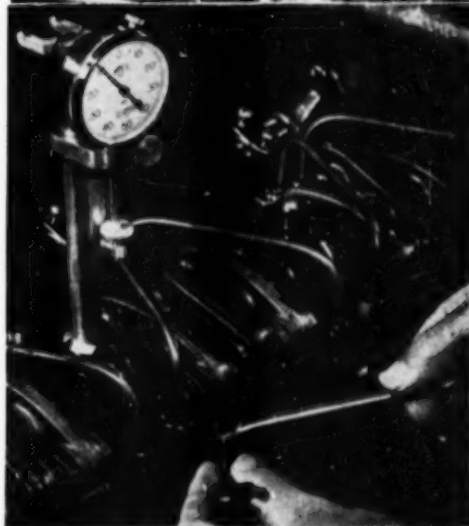
GM-71 Series diesel injector timing tool is slipped over injector with prongs resting securely on injector body and the rack resting on the plunger follower guide. This is second step of timing injectors on GM-71 series engines.

With Valve-Gapper in place, mechanic has both hands free to make adjustments. The base of the tool rests solidly on the injector body while the dial indicator rack rests on the top surface of the plunger follower guide. The mechanic then adjusts timing in the normal manner until the needle is at zero.

BALANCING INJECTORS

Here the P&G Valve-Gapper, Model 201 is being used to balance the fuel injector racks on a GM-71 Series diesel engine. After setting the No. 1 injector rack to the governor in the normal manner, the Valve-Gapper is then positioned between the injector control tube link pin and the cylinder head rim, and the dial adjusted to zero. Spring tension holds the tool in place and the No. 1 rack in full bottom position. Any change in the position of the No. 1 rack will register on the dial indicator.

Adjust each remaining injector rack to No. 1 by turning adjusting screw until needle on dial indicator moves approximately one and one-half thousandths. If needle does not return to zero when tightening locking screw, change adjusting screw until tightening of the locking screw just barely returns the needle to zero. After each rack is adjusted in this manner, all rack settings are perfectly matched to No. 1. As the adjusting screw on each following injector rack is turned, the dial will indicate when the rack is bottomed, as any adjustment past this point will back off the No. 1 rack and change the dial reading. A ratchet adapter is available for the "D" engine.



A CIVIL-DEFENSE INSTALLATION



HOTEL TEQUENDAMA

**A 1040-hp. Fairbanks-Morse OP Diesel Assures
Emergency Light and Power to South
America's Newest Luxury Hotel**

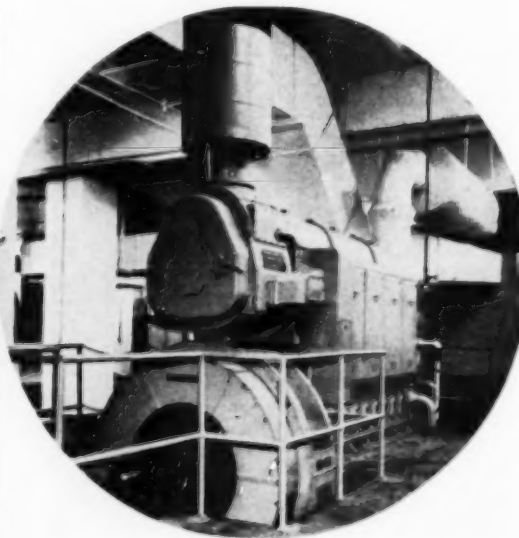
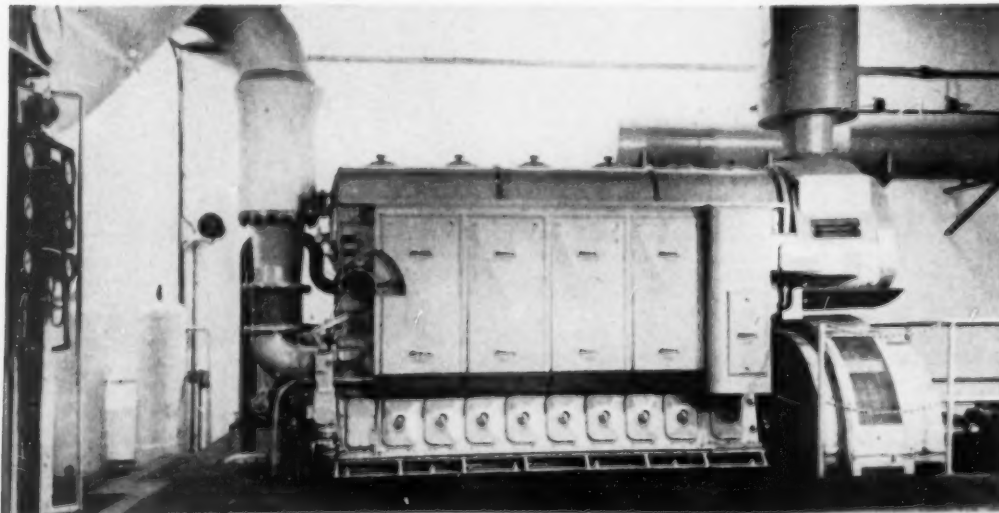
By DOUGLAS SHEARING

LUXURY in accommodations and service characterizes the newly opened Hotel Tequendama in Bogota, Colombia, S.A. And, since even the best in equipment and service needs unfailing light and power, there is provision for emergency electrical power. This safeguard against power failure is a Model 38, Fairbanks-Morse opposed-piston diesel rated at 1040 hp., 700 kw., 875 kw. (80% pf) at Bogota's 8,700 ft. altitude. The diesel drives a 700 kw., 3-phase, 60-cycle, 460 volt, F-M generator. The 16-story Hotel Tequendama was built with particular thought for tourists and visiting business men. Located in Bogota's best busi-

ness and residential section, set off from its surroundings by a small park, the hotel has a total of 386 rooms with an estimated capacity of 650 guests. It is modern both in architecture and fittings. All rooms have central heating; all public rooms—the lobbies, dining rooms, grand ball room, convention halls—are air conditioned. There are magic eye doors, the newest in elevators, burglar and fire alarm systems. All these construction features for the comfort, convenience and safety of its guests made provision of a source of emergency power imperative. The Fairbanks-Morse diesel is capable of providing about 60 percent of the total

power and lighting requirements of the Hotel Tequendama. Provision was made, however, in the sub-basement power room to permit installation of another identical engine should the management find 100 percent coverage necessary. The 1040-hp. engine now installed is mounted on a special isolation base and inertia block which deadens all vibration. The hotel, designed by Holabird & Root & Burgee of Chicago, Illinois, in collaboration with Cuellar, Serrano, Gomez & Cia. Ltd. of Bogota, was built by Intercontinental Hotels Corp., a wholly owned subsidiary of Pan American World Airways, assisted by a \$4,000,000 loan from the Export & Import Bank in Washington, D. C. It is being operated by Intercontinental Hotels Corp. for the owners, San Diego Hotel Co., a Colombian company.

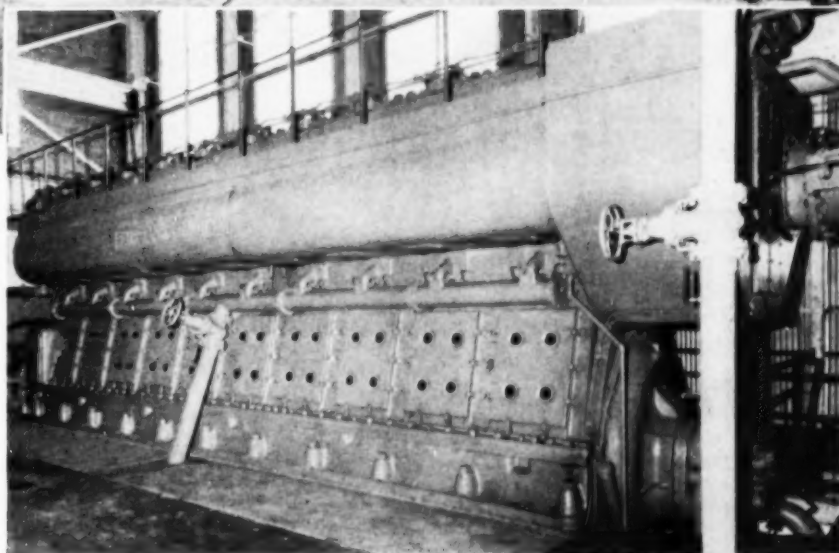
This 1040 hp., 700 kw. F-M OP diesel installed in the basement of the hotel uses Flexonics exhaust flexible hose, Air-Maze air filter, Woodward governor. Note Burgess-Manning exhaust silencer in rear.



DENTON, TEXAS



Installation of the new 3500 hp. F-M engine has raised dual fuel capacity of the Denton, Texas, municipal plant to 8500 kw.



Newest and largest engine in the Denton plant is this 3500 hp. Model 31AD18 Fairbanks-Morse dual fuel unit rated 3500 hp. at 277 rpm.

By R. D. SLONNEGER*

IN one of the most modern and efficient municipal power plants in Texas, a new 3500 horsepower Fairbanks-Morse, Model 31AD18, dual fuel engine has increased the total installed capacity for the City of Denton, Texas, to 8500 kw. of gas burning prime movers. An additional 3500 kw. is provided by straight diesel engines in the old plant.

The story of the Denton Municipal Power Plant for the last 12 years has been one of constant expansion in order to keep pace with the ever increasing power requirements of the community. Table I portrays the increase in average hourly and peak load, and the total yearly output for the ten year period from 1943 through 1952 with estimated figures for 1953. Expressing the data to show the striking increases, the peak load has increased 221 percent, total yearly load 183 percent, while

*Assistant Professor of Mechanical Engineering, The University of Texas.

the hourly average has increased 184 percent. Denton has experienced a 91 percent population increase during the same period. Industrial growth has been largely responsible for the increases. At present there are two senior colleges (one of which is a power customer), a large business form company, two flour mills, a brick yard, a butane tank manufacturing company, and other smaller concerns, requiring power from the Denton plant. Air conditioning increases in the area where there are about ninety days out of each year when temperatures of 90 degrees or higher are registered, have been tremendous. Until recent times most such increases have been in the air conditioning of stores and offices, but the sudden popularity of small units for the home make for greater and unpredictable increases. In 1948, two 3200 horsepower Nordberg engines installed in a new and very modern physical plant, inaugurated a period of very rapid expansion. A 3400 horsepower Nordberg unit pro-

vided a total installed capacity of 6000 kilowatts in 1950. Thus in a year when the peak load was 7000 kw., 6000 kw. were available with much more efficient equipment than the stand-by (for peak load) straight diesel engines in the older plant.

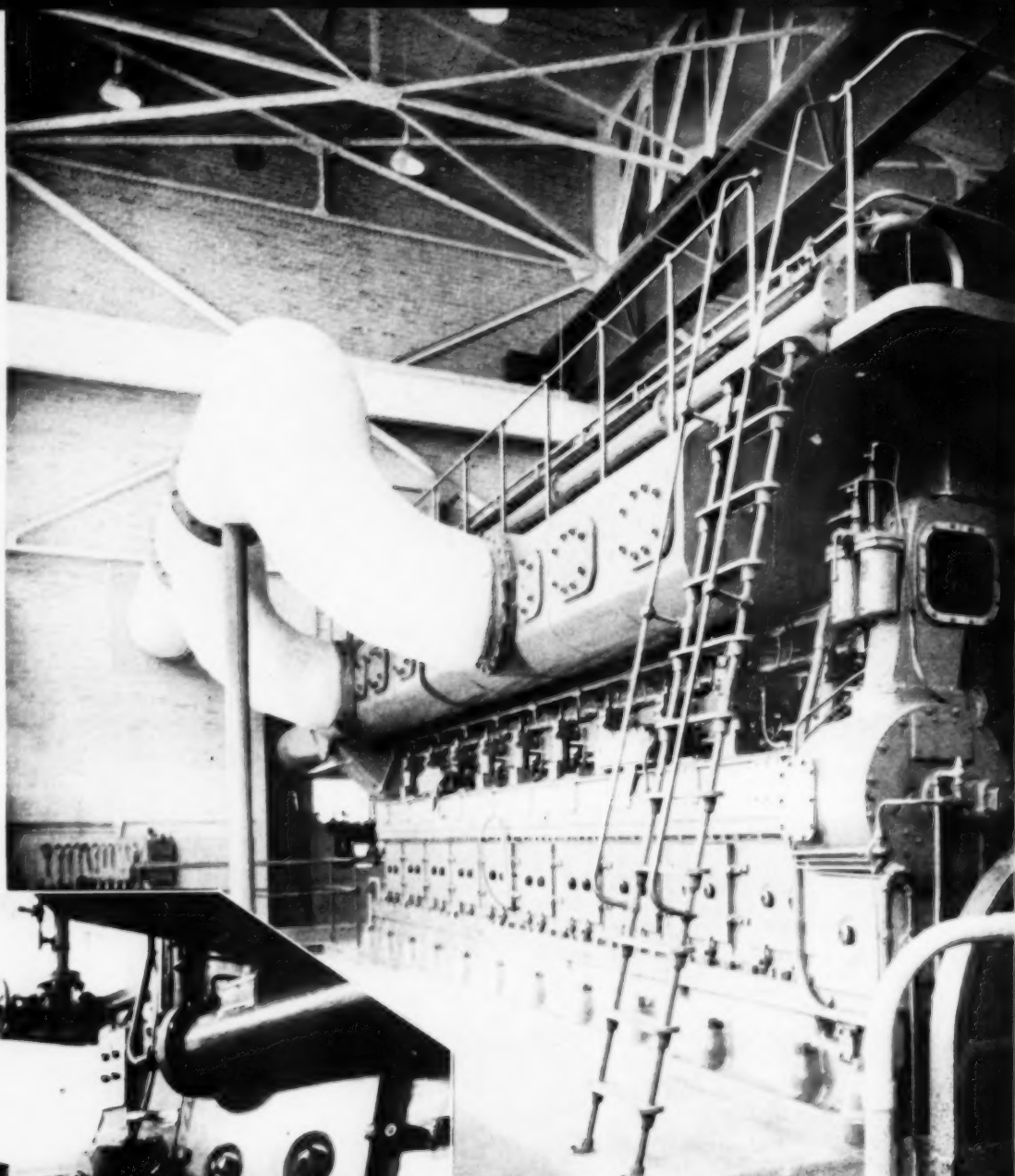
Mr. W. T. Elliott, plant superintendent, has maintained an excellent program of load analysis for prediction purposes in order to provide for a realistic program of plant expansion. Curves for load, average and peak, are plotted against a scale representing years. Thus the growth trend from year to year is clearly pictured. Accurate correlation between predicted and actual values has resulted consistently with this method. Naturally, care must be taken in recognizing unusual years which might tend to throw the general trend of events in error. Other factors which are graphically represented on this curve are installed capacity, total and for the new plant alone, as well as firm capacity for the

same combination. Firm capacity is a term used to describe the plant capacity with the largest unit out of service. At the present time the actual figures of plant capacity are:

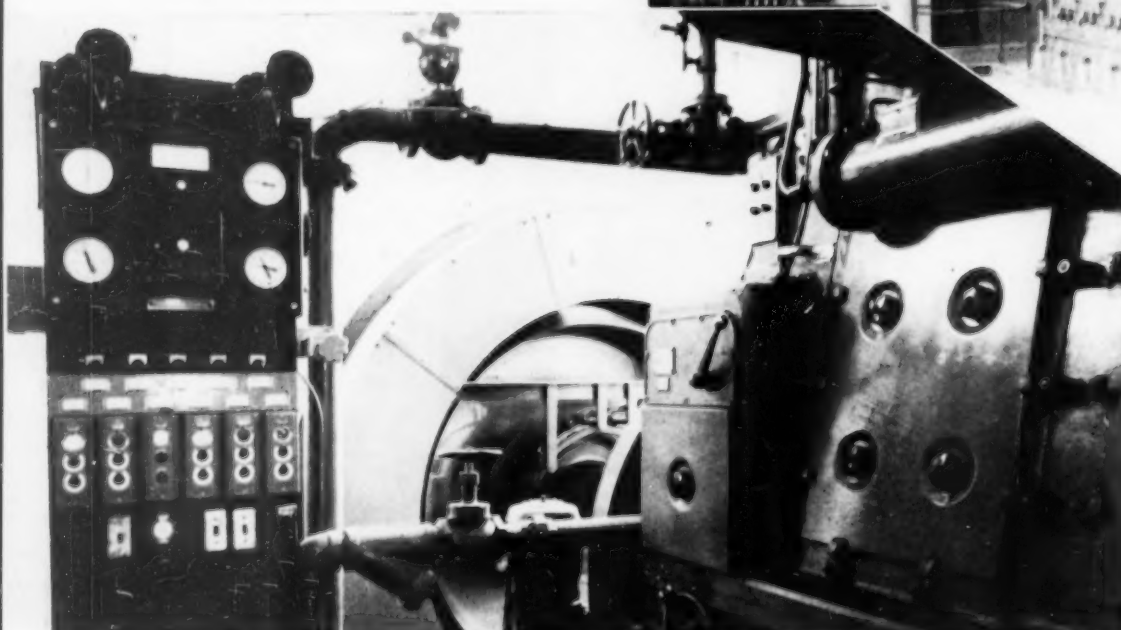
Total installed capacity, new plant..... 8500 kw.
Firm capacity, new plant..... 6000 kw.
Total installed capacity, both plants.....12,000 kw.
Firm capacity, both plants..... 9500 kw.

With a predicted peak of 10,000 kw. in 1953 it is obvious that even more power will soon be required for Denton, Texas. The plant's newest and largest dual fuel engine is a massive, 18 x 27 inch, Fairbanks-Morse, Model 31AD18, 10 cylinder, 3500 horsepower, prime mover direct connected to a 2500 kilowatt (net) F-M generator operating at 277 rpm. Results of the recently concluded acceptance test on the engine indicate that very economical operation will be obtained throughout the usual operating range. Testing was conducted during a period when the ambient temperature was about 85 deg. F., and the calculations were based on a lower heating value for the natural gas of 1036 Btu. per cu. ft. and 19,600 Btu. per lb. higher heating value for pilot oil. The results were:

Load Percent	Heat supplied Btu./kw. hr.
50	11,196
75	9,665
100	9,109
110	9,019

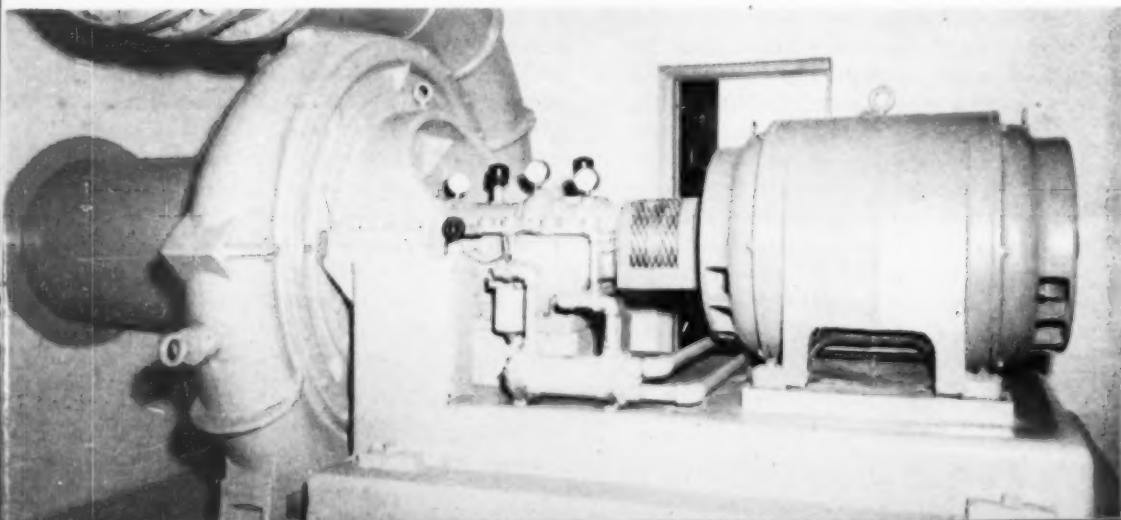


This view on the exhaust side of the 3500 hp. F-M engine shows fuel pumps, Nugent fuel filters and Madison-Kipp cylinder lubricators.



Control station of the new F-M engine shows the simple lever for starting and stopping, the Woodward governor and the panel holding the alarms, push-button controls for auxiliary equipment, gauges and Alnor pyrometer.

Scavenging air for the big F-M engine is supplied by this Roots-Connorsville blower driven by an F-M motor.



Since the F-M engine has been in service only a relatively short period of time, long range performance figures cannot be presented for this unit. However, a study of the operation of the entire plant for the period from June 1952 through May 1953 reveals significant information on dual fuel

TABLE I
Table of Load Growth

Year	Total Generated Kw.	Peak Load Kw.	Hourly Average Load Kw.
1943	12,788,700	2,800	1,450
1944	14,231,900	3,200	1,625
1945	15,233,100	3,250	1,725
1946	18,070,700	3,850	2,075
1947	21,480,800	4,700	2,425
1948	25,483,500	5,800	2,900
1949	29,028,400	6,900	3,325
1950	30,093,200	7,000	3,425
1951	33,768,800	8,200	3,875
1952	36,206,900	9,000	4,125
1953	39,827,500*	10,000*	4,545*

* Estimated.



operation. For the entire period (see Table II) the average fuel cost was 2.05 mills per kw. hr., with the minimum month at 1.68 mills and the maximum month at just 2.47 mills per kw. hr.

Lubricating oil costs for the same period were similarly quite low, averaging 0.20 mills per kw. hour

TABLE II
Operating Costs

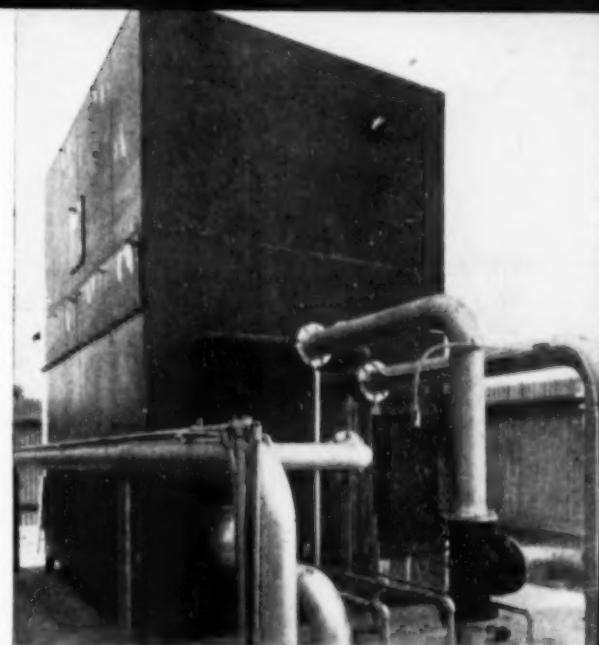
Month	Total Load kwh.	Fuel Consumed		Fuel Cost		Lube Oil Gals.	Lube Oil Cost	
		Oil Gal.	Gas MCF.	Dollars	Mills per kwh.		Dollars	Mills per kwh.
1952								
June.....	3,234,000	15,128	28,759	\$5,474.52	1.69	977	\$488.50	0.15
July.....	3,526,000	16,384	31,146	5,908.73	1.68	993	496.50	0.14
August.....	3,663,000	16,752	36,608	6,668.41	1.82	1238	619.00	0.17
September.....	2,733,000	13,197	30,404	6,586.87	2.41	1800	900.00	0.33
October.....	2,475,000	12,198	22,004	5,037.85	2.04	1020	510.00	0.21
November.....	2,520,000	14,784	27,349	6,232.41	2.47	925	462.50	0.18
December.....	2,708,000	14,850	23,202	5,126.74	1.89	1034	517.00	0.19
1953								
January.....		14,056	27,662	6,071.32	2.31	1042	521.00	0.20
February.....		13,445	23,359	5,259.29	2.10	982	491.00	0.20
March.....		14,848	23,962	5,551.38	1.99	1118	559.00	0.20
April.....		16,830	23,747	5,730.15	2.23	1065	532.50	0.21
May.....		19,319	25,382	6,221.18	1.99	1297	648.50	0.21

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including a complete oil change for one of the units. Totalling average costs for fuel and lubricating oil results in an average cost of operation for the 12 months period of 2.25 mills per kw. hr. Further checks on the operation of this engine since May reveal an improvement of approximately 7% in the overall cost of plant operation with the FM unit in regular service.

Mr. Elliott and his competent staff at Denton have gained much useful information during their experience operating large engines. The installation of the F-M engine has given them an opportunity to apply the lessons learned from previous experience. This has resulted in a well-engineered, easy-to-operate, and easy-to-maintain installation. Room for the new unit was provided in 1950 when the plant was expanded with the first addition. A steel rear wall in the plant construction permitted this expansion and will provide for future growth. At the time of the first addition, space for three additional engines was added, so one more engine can be set up before some more building space will be needed. Prime movers are installed side by side across the operating space which is wide enough to provide ample room for service without demanding too long a run for inlet and exhaust ducting. A high ceiling makes the plant well lighted and ventilated as well as providing space for a crane of 10-ton capacity. A small anteroom was added to house the scavenging blower and its motor drive. Space in a large basement houses engine auxiliary equipment and the fuel day tank. Slots, normally covered with a steel cover plate and large enough to accommodate connecting rods, have been cut in the operating floor alongside the engine. Thus when a piston and rod assembly is removed it can be lowered with the rod extending through to the basement and the piston resting on the operating floor, resulting in more convenience for the maintenance crews.

Natural gas at 30 psig. in the mains is metered by the gas company then regulated to 28 psig. for the new engine. Gas scrubbers, to insure clean, pure gas, are used on each line to the engines as added protection deemed essential for this large engine plant. Gas pressure to the cam and rocker arm actuated, poppet-type, gas admission valves is controlled by the governor. Engine speed and load is



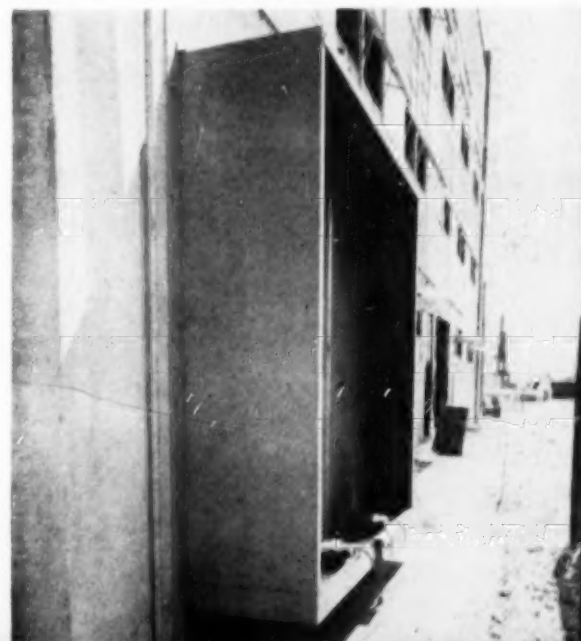
Jacket water for the new engine is circulated through this F-M evaporative cooler. There are also coils for the engine's lubricating oil.

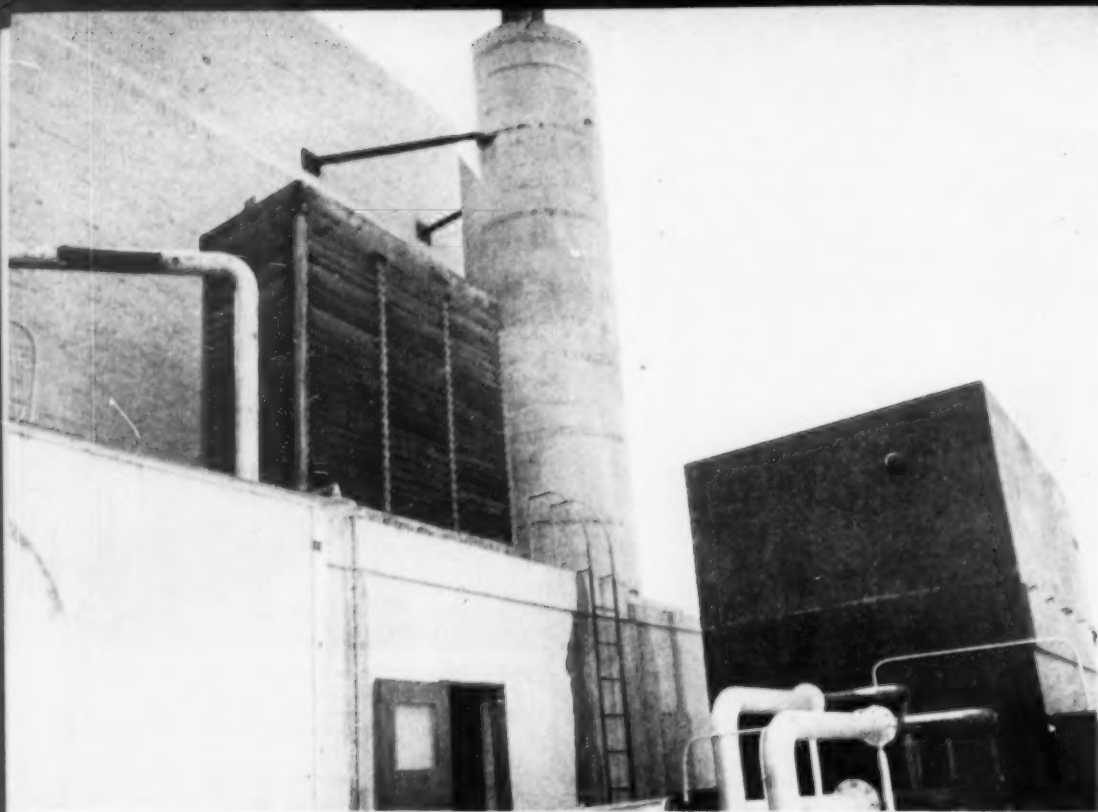
thereby regulated by varying the quantity of gas admitted. Changes in the gas pressure with load are as follows:

Load percent	Gas pressure psig.
110	19
75	13
50	9.5

Pilot fuel is stored in two 40,000 gallon above-ground tanks. Transfer to the 600 gallon day tank situated in the basement is by gravity; the fuel passing through a positive displacement meter in transit. Delivery to the injection pumps is by means of an engine-driven gear type pump through a filter. Two injection pumps, one for pilot fuel and the other for straight diesel operation, on each cylinder feed a common injector. The delivery of pilot oil is independent of load, speed and mode of operation (dual fuel or diesel). For diesel operation, injection pumps of the spiral recessed-plunger type are employed. Fuel oil is pumped first to the pilot pump header, then to the injection pump header with overflow quantities returning to the day tank. For normal dual fuel operation, the control racks on the injection pumps

Air for the new engine is drawn through an American self-cleaning filter fitted with an evaporative cooling pad.





The Marley cooling tower (upper left) cools intake air for the Fairbanks-Morse engine. The engine is also served by the Maxim exhaust silencer and F-M evaporative cooler at right.

allow the units to operate without discharging to the injectors. Automatic change-over to diesel operation when natural gas pressure falls below governor demand pressure is accomplished on the F-M engine with a unique new controller. Injection pump control racks are forced into engagement with the governor by means of a spring. In order to permit dual fuel operation the control racks must be moved to the no delivery position by overcoming the resistance of the engaging spring. Hydraulic pressure (actually engine lubricating oil) is used to provide the overcoming force. The pressure of the "control" oil is changed by variation in gas pressure acting on a diaphragm in the unit. Thus a reduction in gas pressure reduces the "control" oil pressure until the oil pressure becomes so low that the spring on the injector pump racks overcomes this force. Then the pumps are engaged with the governor and the unit runs as a straight diesel. In order to prevent undesirable back and forth switching from gas to diesel, a solenoid actuated valve in the gas line is closed when automatic changeovers are made. Returning to dual fuel operation is accomplished by manually opening the gas supply line. A detergent oil has been selected for use in this F-M unit. The lube oil system is supplied by the engine-driven pump through a strainer and a filter with cellulose type

cartridges. Before-and-after service is maintained by a motor-driven gear type pump. The evaporative cooler cools oil as well as jacket water. Two motor-driven pumps handle cooling water through the engine and to and from the evaporative cooler, which is located just outside the building. Other engines in the plant operate on a closed cooling system with a cooling tower, so the incorporation of an evaporative cooler is a departure from previous policy. Automatic controls in the oil and water circuits maintain maximum temperatures at the proper operating level. During the summer months oil enters the cooler at 154 degrees F. and leaves at 146 degrees F., while the water enters at 143 degrees F. and leaves at 138 degrees F. Much progressive work has been accomplished at Denton in the matter of cooling air supplied to the engines. With high average ambient temperatures, air cooling is most essential if the prime mover is to operate at full capacity. On the suction side of the oil bath, traveling chain air filter, an evaporative cooling pad has been installed. This pad is wetted with a slinger pump operating in a reservoir with float level control. Air leaves the filter within six to seven degrees of the wet-bulb temperature—77 degrees during the hot, dry summer months is a good average value. This washing also provides cleaner air and some raising of the deto-

nation limit of the fuel also results. It is obvious that many more pounds of air at 83 degrees can be inducted into the engine than if air at 95 to 100 degrees F. were used. After leaving the filter, the air enters a motor-driven centrifugal blower.

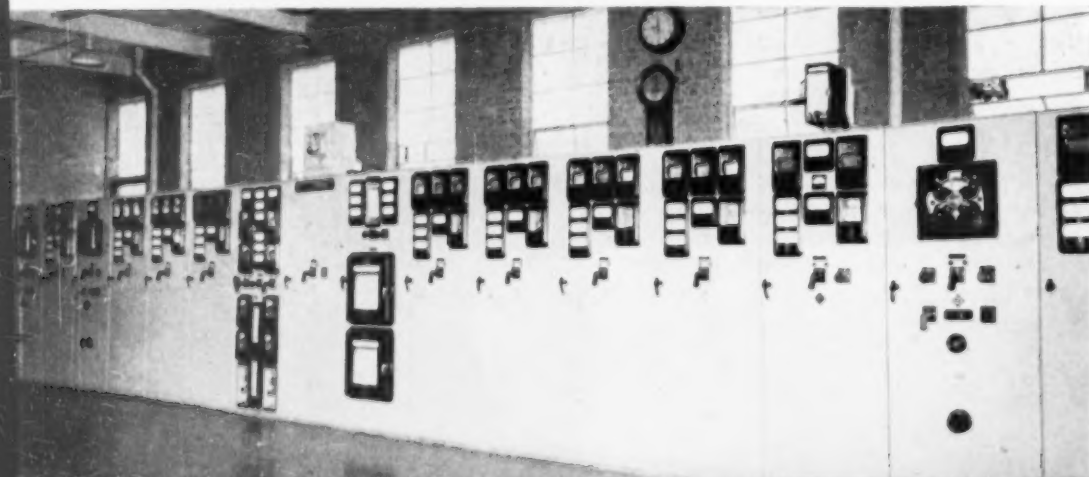
The blower motor and the alternator are coupled electrically in such a manner that when the engine starts the blower also turns over. Batteries or a motor generator set are used to energize the alternator field to provide the initial excitation. From the blower, the air at 2.4 psig. passes through another heat exchanger—this one an integral part of the engine—where the temperature is reduced about 10 degrees. Raw water for this heat exchanger operates in a separate circuit being cooled in a small cooling tower located atop the blower annex superstructure. An exhaust silencer receives the products of combustion from a large sized, straight exhaust header. A 2500 kw. (net after subtracting power for the scavenging blower) Fairbanks-Morse alternator is directly connected to the engine, and the exciter is belt-driven. Another heat exchanger is provided for the outboard bearing on the alternator end of the unit. An exciter control panel is located near the exciter, whereas the electrical panel is an integral part of the existing engine and feeder panel. Generator voltage is 2550 volts. An alarm and gauge panel located at the governor end of the engine enables the operator to know at a glance the important operating features. In addition to the usual gauges, pyrometer controls, and alarms, indicating controls are provided for the various water and lube oil pumps.

Safety, convenience, and ease of operation are the factors which were most considered for the unit. The operators at Denton are expecting reliable, low cost operation from this latest addition to a well run plant.

List of Equipment

Engine—Model 31AD18, 3500 hp., 277 rpm., 18 x 27, 10 cylinder, Fairbanks Morse.
 Generator—2500 kw. (net), Fairbanks Morse.
 Exciter—Belt-driven, Fairbanks-Morse.
 Blower—Centrifugal, Roots-Connorsville.
 Cylinder lubricator—Madison-Kipp.
 Evaporative cooler—Fairbanks Morse.
 Fuel oil—Premier Refining Co.
 Gas fuel—Lone Star Gas Co.
 Lubricating oil—Continental Oil.
 Lube oil pump—Roper.
 Before and after operation pump—Roper.
 Governor—Woodward.
 Fuel filter—Nugent.
 Gas scrubber—Blaw Knox.
 Gas regulator—Fisher Governor.
 Air filter—American Air Filter.
 Air intake evaporative cooler—Alton.
 Cooling tower (for air after cooler)—Marley.
 Lube oil filter—Fairbanks Morse.
 Lube oil strainer—Fairbanks Morse.
 Oil thermostat—Amot, American Motors.
 Exhaust silencer—Maxim.
 Pyrometer—Alnor.
 Fuel meter—Niagara.
 Alarm panel—Fairbanks Morse.
 Switchboard—Allis-Chalmers.

The electrical panel serving the new engine is part of the big Allis-Chalmers switchboard.



Vice-President and General Manager



Philip W. Mettling

Mr. Fred D. Durham, president of the C. Lee Cook Manufacturing Company of Louisville, Kentucky announces the election of Mr. Philip W. Mettling as vice president and general sales manager. The C. Lee Cook Manufacturing Company are manufacturers of metallic compressor piston rod packings and graphitic iron piston rings. They have been furnishing these to the marine industry, the oil and gas industry and the diesel industry since the year 1888.

Mr. Mettling comes to the Cook Company with a background of a great deal of experience in the engine and compressor fields. For the past 11 years he has been the Los Angeles manager for the Cooper-Bessemer Corporation covering the southwestern part of the United States. He is a mechanical engineering graduate of Purdue University. He has been a director of the California Natural Gasoline Association and has been active in the Pacific Coast Gas Association. He has also been president and a director of the Purdue Club of Southern California and a director of the Big Ten Club of Southern California.

Mr. Mettling will be located at Louisville. The C. Lee Cook General Sales Office has now been moved from 76 Beaver Street in New York City to their home plant in Louisville.

Civil Defense

Katolight Corporation of Mankato, Minnesota, announces a new group of 1800 rpm emergency power generators designed to combat the crippling effects of a power failure. The generators range in sizes of from 2000 watts to 15,000 watts, easily belted to the ordinary farm tractor or any other speed governed engine power. They develop the same 115/2300 voltage as supplied by the highlines and come in two designs: revolving armature and revolving field. The latter having a separate direct connected exciter is particularly noted for its exceptional overload and motor starting ability. A standard rheostat can also be supplied along with necessary approved transfer switches. The generators are also available in 3 phase characteristics. A free folder EG1153 depicts its application, listing features, specifications and prices. Katolight also has available complete power plants for all applications.

AND AFTER ALMOST A CENTURY...



You assure all this when you specify Farris Pickering Governors—dependable performance that has built the Pickering reputation for nearly a century . . . advanced design that incorporates all the improvements developed by constant research and modern engineering techniques . . . precision manufacturing on the most up-to-date production equipment . . . superior service, with immediate availability of replacement parts and rapid processing of orders and shipments. With more than 600,000 now in use throughout the world, the Pickering Governor record speaks for itself.

--and you SAVE when your Pickering Governors are "factory serviced"



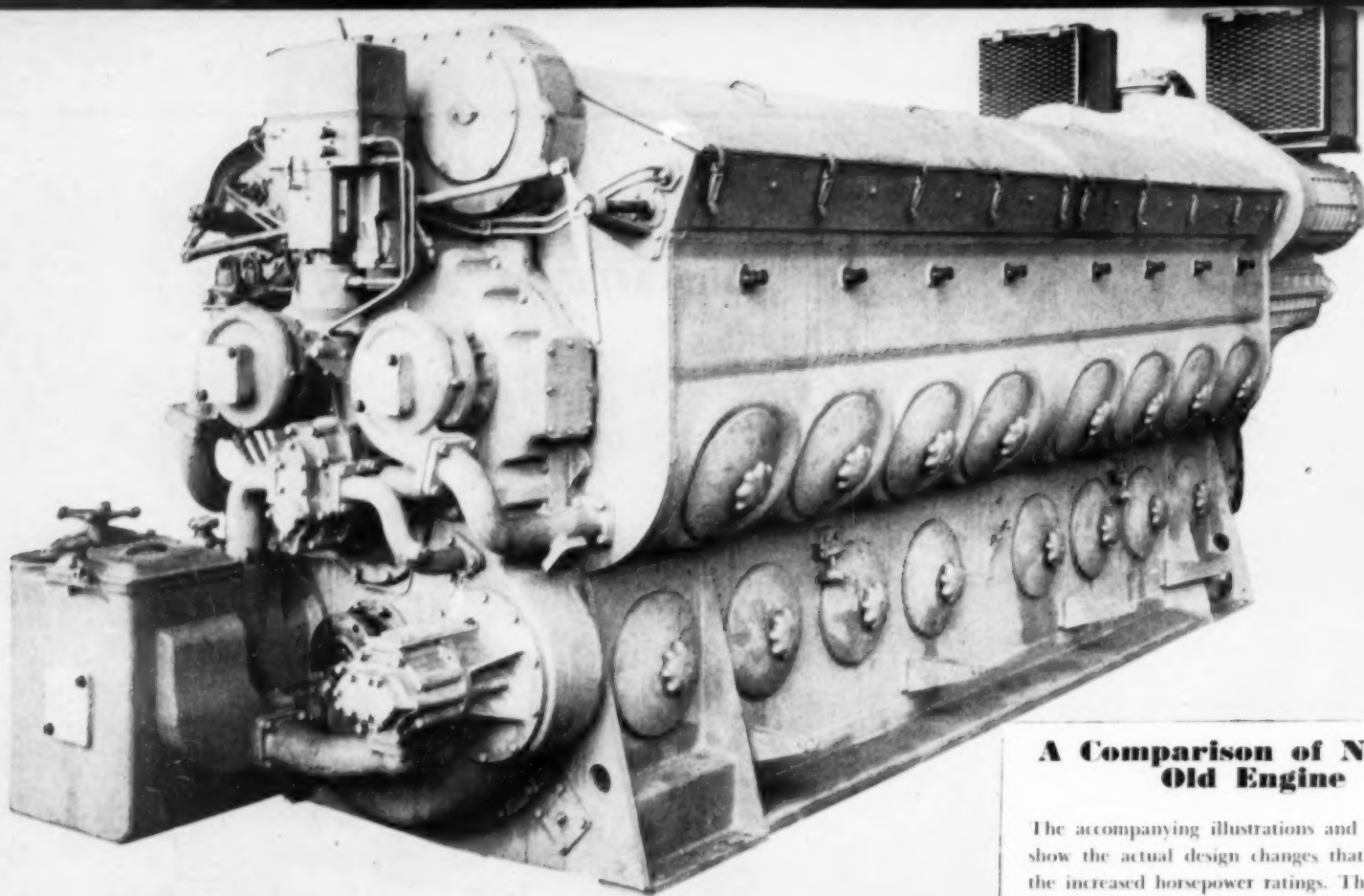
Your original service cost is your only cost. You get factory "know-how", factory parts, factory adjustments. You get fair-price repairs with parts supplied at net. Your governor is tested and set on a \$25,000 dynamometer — not a junior-sized, "just as good" portable unit that cannot give you load control governing results. You get a Factory Rebuilt Guarantee. Send your governor "home" for service — and save!

Precision Speed Controls Since 1862



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Farris Engineering Corp.
Farris Flexible Valve Corp.
Farris Stäcon Corp.
Farris HydroTorque Corp.
Farris HydroSeal Corp.



A Comparison of New vs. Old Engine

The accompanying illustrations and explanations show the actual design changes that allowed for the increased horsepower ratings. They also show how the new engine has been designed for longer service with lower maintenance costs. Wherever applicable, in the two cutaway views, changes have been indicated by the same number corresponding to the numbered change in the above text.

The engine in all units has an entirely new crankcase designed for longer service life. End plates are heavier and thicker to allow more overhauls for the life of an engine.

1.) The box frame sections around the cylinders is made stronger and thicker, measuring $\frac{3}{4}$ in. thickness compared to $\frac{1}{2}$ in. thickness in the old model.

2.) The top member of the "V" frame section is the rigid tie bar across the top of the cylinders leaving everything above this tie free from former stresses that were encountered in the old model, where the rigid tie was across the top of the cylinder head.

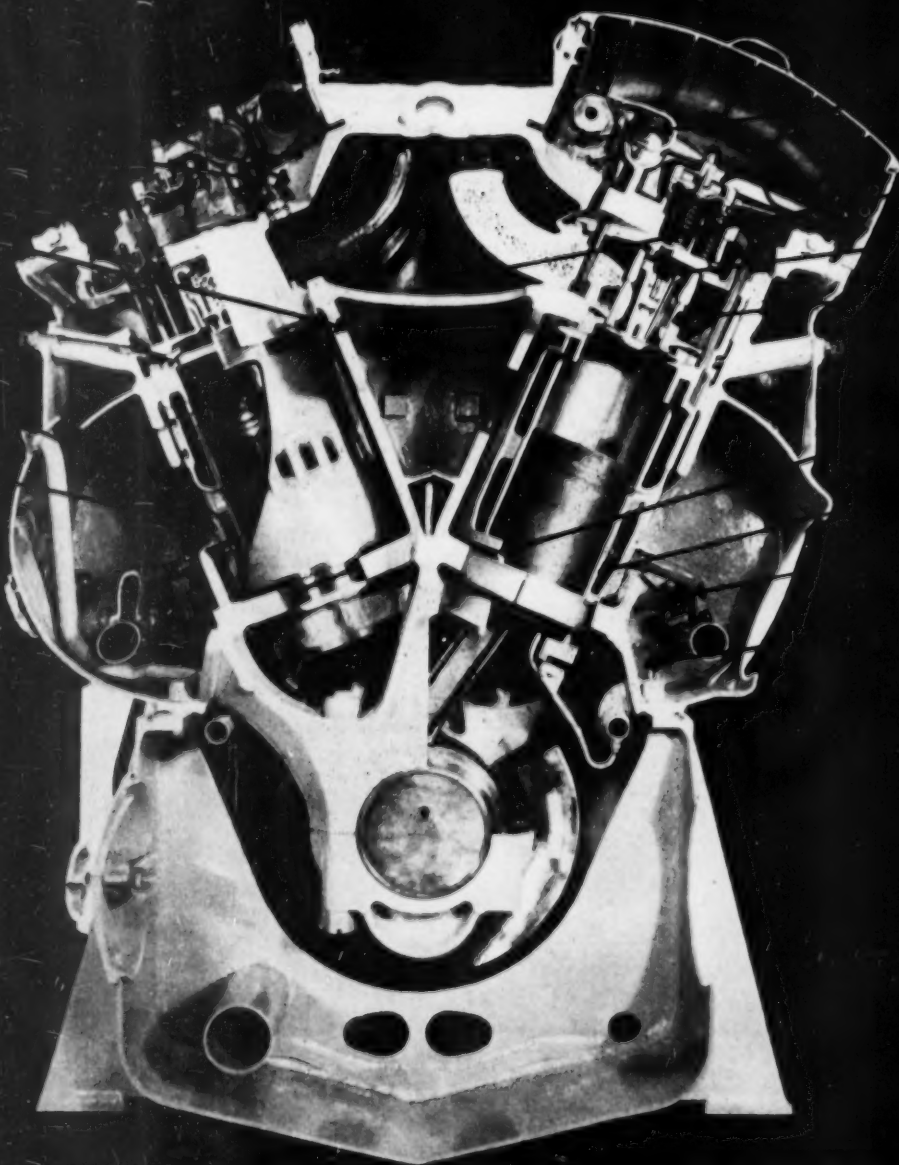
3.) The base rail is an integral rolled section, thereby eliminating base rail gussets in the old model and providing rigidity and freedom from cracks in this stress area.

4.) The cam pad is an integral forged part of the top-deck member. This alleviates the problem of cracking in the old cam pads, which were welded onto the top-deck member.

5.) The outer section of the crankcase containing the handhole covers is now circular to provide greater rigidity and less vibration, thus reducing the noise of the engine.

6.) New circular cast aluminum handhole covers with rubber seals to prevent oil leaks replace the old covers. The new top-deck covers are also of cast aluminum construction with a rubber seal and special hinges and latches to prevent oil leaks.

THE NEW



ELECTRO-MOTIVE DIESEL

By BRUCE WADMAN

THE Electro-Motive Division of General Motors Corporation has introduced a new, more powerful Model 567-C diesel engine. The new Model C engine has many advantages over the old Model 567-B engine. It takes advantage of increased horsepower that always has been potentially available in the 567 series engine. The new engine in the 16 cylinder version provides 1750 horsepower for propulsion. This is an increase of 250 horsepower over previous models. Maximum rpm. is 835 against 800 of its predecessor and its size has not been increased. New horsepower ratings of other engine sizes are as follows: 12 cylinder model, 1200 horsepower (an increase of 75 hp.); 8 cylinder model, 900 horsepower (an increase of 100 hp.).

Five things have been done to bring about this increased horsepower rating. (a) More fuel is delivered by the injector. This results in more engine heat. (b) An improved and increased capacity cooling system of the engine and cylinder head to

take care of the additional heat. (c) "Stellite" valves in the 16-cylinder engine to help in meeting the increased heat problem. (d) A heavier crankcase to take care of the additional stresses. The stress level of the C crankcase is now actually lower than the B. (e) Increased blower speeds to provide more air necessary for proper combustion.

The net result is a 1000 hp. increase in the propulsion power of a four-unit diesel freight locomotive in the new line of ten types of railroad motive power. The four-unit locomotive has been increased from 6000 to 7000 hp. This is 1600 hp. more than the horsepower rating of the first U.S. diesel freight locomotive brought out by EMD in 1940, reflecting technological advance in the locomotive field over the thirteen year period. Deliveries of the ten new types of locomotives from EMD plants begin this month.

Most of the increases in ratings or in service life of the locomotives stem from the introduction of

the new General Motors Model 567C diesels upon which EMD engineers have been working for five years. A new traction motor has also, in the words of GM vice president, Mr. N. C. Derendorf, EMD general manager, "made possible the elimination of arbitrary short time ratings for all models and all gear ratios."

The new traction motors, with the higher ratings of the new Model 567C diesel engine, make it possible to haul more tons or haul the same tonnage faster. Other major improvements in the new locomotives include a sealed gear case with a newly developed stable lubricant which provides up to ten times the previous lubricant performance. In test runs this gear has run on western railroads for more than a year in heavy service without loss or addition of lubricant.

Electrical control apparatus has been greatly simplified through the use of newly developed contact materials and more direct mechanical motions eliminating joints, bearings, complicated linkages and flexible shunts. The new controls are designed for six year maintenance-free operation. New wheel slip control and automatic sanding equipment has been designed to effectively utilize the greater horsepower and tractive effort. New engine cooling capacity and brake rigging stabilizer are featured.

7.) Large water seals on cylinder liners and heads are eliminated through the use of replaceable water inlet manifold jumper lines individually connected to the newly developed liners and heads.

8.) The only seals used now are two small "O" rings, one in the inlet manifold jumper in the liner and one in the discharge manifold jumper in the head.

9.) Stress plates are no longer subject to corrosion from water contact. The liner water jacket is closed at the bottom whereas in the old model water circulated around the stress plates below the liner. The manifold jumper lines reduce the possibilities of water leakage and are easy to inspect and replace without removing major assemblies.

10.) The steel tube manifold pipe is replaceable in the new model; it was welded to the crankcase in the old model. This provides for easier maintenance.

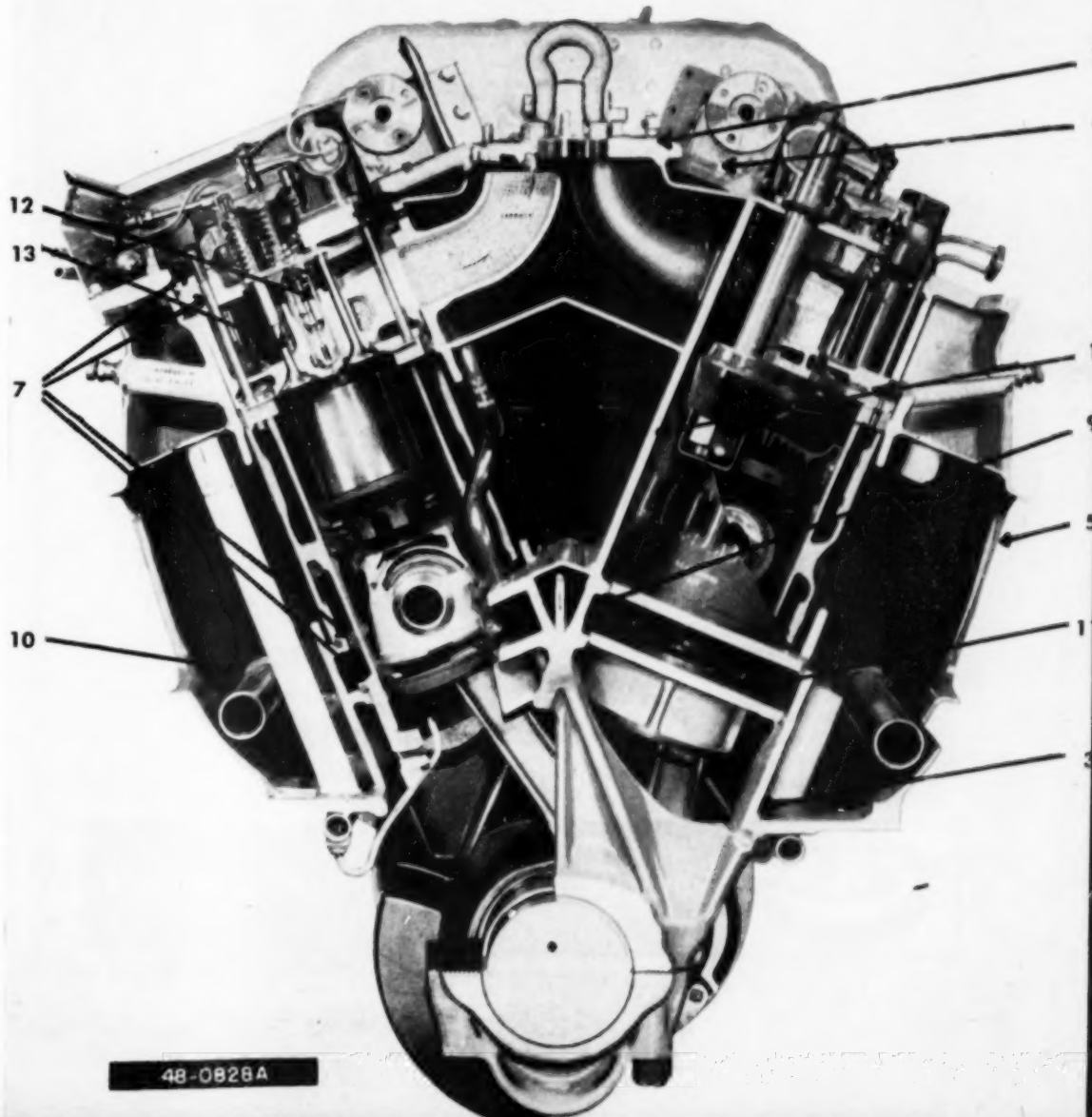
11.) A new removable cast iron pilot insert for the cylinder liner replaces the old permanent liner pilot. The new pilot is easily removable and replaceable.

The fuel injection system has increased capacity to provide for increased horsepower.

12.) The fuel injectors have increased output by lengthening the stroke of the injector plunger. The higher output injectors now have a capacity of 700 cu. mm. compared to a previous capacity of 600 cu. mm.

13.) New "Stellite" valves are being incorporated in the 16 cylinder model to provide for longer valve life and better heat transfer characteristics.

THE OLD



Diesel Symposium

Publication of a diesel engine maintenance symposium book has been announced by the American Locomotive Company. The 145-page manual summarizes the complete text of a two-day symposium on a diesel locomotive engine maintenance held by the company in Schenectady last Spring, and includes 31 individual papers and articles representing the views of 21 participating railroads. The 1953 Symposium covered such subjects as spectrographic analysis of lubricating oils, filtering and filtering media, cooling water treatment, and railroad applications of the electron microscope. Among the features of the Symposium book are more than 50 photographs of various types and

qualities of lubricating oils taken through the electron microscope. These photos show how this new research tool is being used as a valuable adjunct to the spectrograph in the analysis of internal-combustion engine lubricating oils and fuels. In addition to nine papers summarizing recent progress in the use of the spectrograph on representative railroads, there are papers and tables on comparative spectrographic laboratory results, lubricating oil control testing methods, and extensive sections on both oil and air filtering and filter maintenance. The book has a five-page index in which the entire subject is carefully cross-indexed. Copies may be obtained by writing American Locomotive Company, Public Relations Department, Building 143, Schenectady, N. Y.

Hercules Officers



John C. Keplinger

At a recent meeting of the board of directors of Hercules Motors Corporation, Canton, Ohio, manufacturers of diesel engines, Mr. John C. Keplinger was elected president. Charles Balough was appointed board chairman. The new president, a graduate of Cornell in 1914 with a B.S. degree, joined Hercules Motors Corporation in 1926 as sales manager. Mr. Keplinger became vice-president in charge of sales in 1931. He was elected to the board of directors in 1934 and elected executive vice-president in 1948. He is a member of many trade organizations and active in Canton civic groups. Charles Balough, the new chairman of the board of directors, was one of the organizers of Hercules Motor Manufacturing Company, founded in 1915. He has been a director of Hercules Motors Corporation since its organization in 1923 and president since 1929. Mr. Balough succeeds Gordon Mather, now retired. Mr. Mather was the former board chairman and one of the founders of Hercules. Other appointments are: Lawrence G. Downey, vice-president; George W. LaSalle, vice-president; F. H. Geisler, director of sales; Dr. E. A. V. Horiak, chief engineer.


Other officers of Hercules Motors Corporation are: M. C. Kuepfer, vice-president in charge of production; A. R. Miller, vice-president in charge of purchasing; D. W. Latta, vice-president; J. D. Cook, secretary and treasurer.

Engine Hour Meter

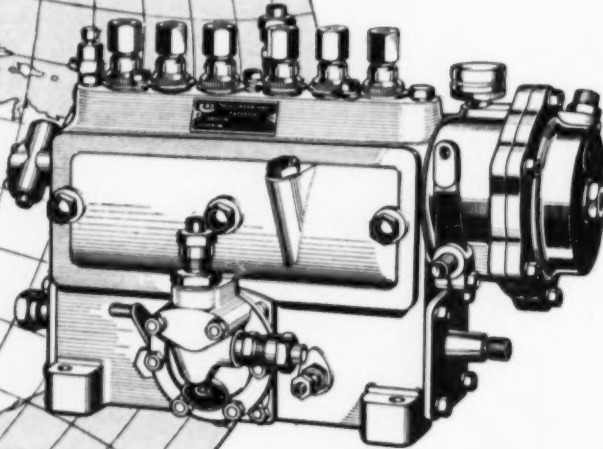


Powered equipment is precision made and will give top performance year after year if treated properly. To be most effective and at lowest possible cost, servicing must be done on time and guesswork eliminated. For timing actual hours of engine operation, John W. Hobbs Corporation produces the Hobbs engine hour meter. An electrically wound clock, it reveals at a glance how long an engine has run. The meter operates from the storage battery or, for equipment without a storage battery, from four dry cells or a "hot shot" battery. As the meter is connected to an oil pressure switch, mounted at any convenient place in the oil pressure system, it will start to register only when the oil pressure rises. Meters are furnished in two mounting types—standard and flush (shown). The standard has three holes for screw mounting on or near the instrument panel. The flush type can be mounted on a panel without screws, held in place by the clamp.


YOUR COPY OF DIESEL ENGINE CATALOG in its eighteenth completely re-edited, revised and expanded edition is now off the press. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this latest edition now. Profusely illustrated. \$10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.



The world's largest manufacturers of Fuel Injection Equipment for diesel engines



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in over
100 countries*



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CLEVELAND 7, OHIO.**

General Purpose Tractor

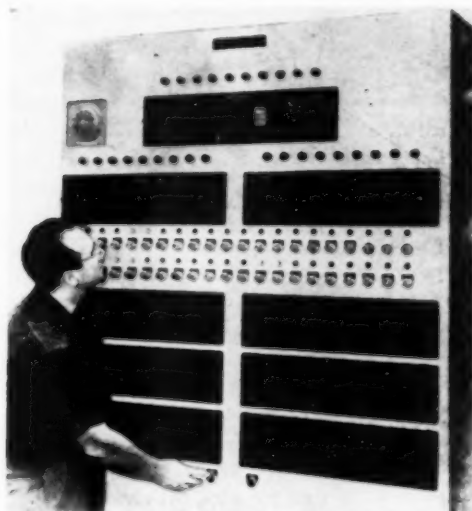


W. H. Nelson, Pearland, Texas, bought this Wagner Tractormobile from South Texas Equipment Company, Houston. The unit is powered by a Buda Model DAS 516 supercharged diesel, rated at 165 hp, continuous loading at 2400 rpm. The Tractormobile is designed as a farm and general purpose tractor, developing 80 drawbar hp. It has high flotation and traction due to the 18 x 24 tires, has four-wheel drive, and center pivot steering. The twist-turn feature (rear assembly can rotate vertically about the pivot point) permits the unit to maneuver readily in such rough terrain as rice fields intersected by irrigation ditches. Prior to delivery, the unit was serviced by the Buda Engine & Equipment Company, of Houston; Archie Benson, service manager, is at the controls.

Elect W. A. McDonald

The board of directors of the Sterling Engine Company, Buffalo, N. Y., have elected W. A. MacDonald as executive vice president of the company. MacDonald joined Sterling November 13, 1951, as sales manager and was promoted in December 1951 to vice president-sales. He is particularly well known in industrial and automotive circles, having previously served as vice president with Hupp Motors, Willys-Overland Company and the Kaiser-Frazer Corporation.

Annunciator Analyzes Cause of Shut-Down



A new type of annunciator system which automatically indicates the sequence of "off-normal" alarms has been announced by Panalarm Products, Inc., following more than a year of test field installations. These annunciators are desirable where alarms are applied to closely inter-related variables. In most of these applications, if any one

of the variables goes "off normal," the process shuts down. Sequence indicating annunciators pin-point the cause of trouble by indicating the first variable to go "off-normal." This is accomplished either by automatic lock-out of subsequent signals, or by causing the first signal to be red and subsequent signals white. A pushbutton reset feature is also available which causes the sequence indication to start over again.

In addition to use in compressors and process applications where the cause of trouble is sought, sequential annunciators are also advantageous on dangerous processes where operators want to be sure the entire process has shut down when trouble occurs. Alarm signals are grouped for

sequential lock-out by simple jumper connections on the rear terminal block, and any number of inter-related groups may be formed or interchanged as desired. All contacts, relays and other moving parts are within hermetically sealed plug-in units. Thus, additional signals may be added by simply adding plug-in units to the common chassis, and the entire system is suitable for Class I, Division 2 locations.

Visual Sequence Annunciator Systems are available in standard Panalarm backlit nameplate cabinets providing for 3 to 48 signals. Further information is available upon request to Panalarm Products, Inc., 6312 North Broadway, Chicago 40, Illinois.



WHAT'S YOUR APPLICATION



13 HP, V Type air cooled Hallett Diesel with 20:1 compression ratio.

Original equipment manufacturers everywhere are depending upon Hallett, the leader in lightweight, economical, dependable, Diesel engines. Find out for yourself how a Hallett can add customer appeal to your product and give added years of trouble free dependable Diesel service.

Sales and service throughout the world.

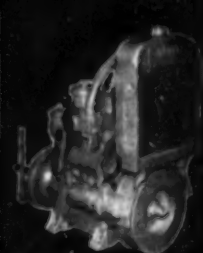
District Sales Offices:
Washington, D.C., 13th and E Streets; Detroit, Mich., Book Tower Bldg.; New York, N. Y., Grand Central Bldg.; Chicago, Ill., 600 So. Michigan Blvd.



8 HP @ 1500 RPM, dependable, single cylinder, water cooled Hallett Diesel used throughout the world.



5 HP @ 1800 RPM, lightweight, air cooled Hallett Diesel weighs less than 240 pounds.



18 HP, water cooled unit preferred by original equipment manufacturers and foreign buyers everywhere.

HALLETT MANUFACTURING COMPANY
1603 West Florence Avenue • Inglewood, California

My application is _____
Please send me full details on the Hallett Diesel Engines.
Name _____
Firm Name _____
Address _____
City _____ Zone _____ State _____

Exhibited at Boat Show



Model 3MDSP

Three models of marine electric generating plants will be shown by D. W. Onan & Sons Inc., Minneapolis, Minnesota, at the 1954 National Motor Boat Show this month. Two are gasoline-driven models, 1,000 and 1,500 watts, while the third is a diesel-driven generating plant of 3,000 watts capacity. The diesel unit, Model 3MDSP, introduced at last year's Boat Show, is a water-cooled, single-cylinder generator set that will

operate efficiently on any type of diesel fuel from No. 3 furnace oil to premium grades. Both the full diesel engine and the direct connected generator are completely Onan-built, incorporating every practical safety feature. Model 3MDSP is extremely compact (30½ in. length, 21¾ in. width, 29¾ in. height) and can easily be installed on any type pleasure craft, work boat or barge. The 3,000 watt unit can be supplied in both ac. and battery charging models.

Seventh Factory Branch

North Salt Lake City, Utah, will become the site of the seventh in the national chain of factory branches for the rebuilding of principal compon-

ents of diesel locomotives, such as diesel engines, traction motors and generators, late in 1954, according to an announcement in LaGrange, Ill., by N. C. Dezendorf, vice president of General Motors and general manager of Electro-Motive. Construction will be started next spring. The new plant will consist of an office building 66 by 66 feet and a factory building 156 by 300 feet, both one story and of brick, concrete, steel and glass construction. It will be located on a sixteen acre plot adjacent to the Union Pacific Railroad on the south side of 6500 South Street, North Salt Lake City.

The seven factory branches serve the 200 railroads that use General Motors diesel locomotives, which are manufactured in LaGrange, Ill., and Cleveland, Ohio. The North Salt Lake City branch will serve the railroads that traverse the northwest quarter of the country, roughly from Denver to the Pacific. The branch will rebuild worn engines, generators and traction motors with the same materials, methods and machinery as used in the manufacture of new components at the parent factories, delivering them to the railroads with the same guarantee that Electro-Motive gives on a new engine, generator or traction motor. The other factory branches are at Emeryville, Calif.; Los Angeles, Calif.; Robertson, Mo.; LaGrange, Ill.; Halethorpe, Md.; and Jacksonville, Fla.

RUGGED . . . POWERFUL . . . MANEUVERABLE EASY TO INSTALL and SERVICE HARBORMASTER OUTBOARD PROPULSION



SPECIAL features not found with ordinary marine power make Harbormaster Outboard Propulsion and Steering Units tops for performance and most practical for tough jobs. Where you want rugged, dependable operation with a minimum of service and maintenance, and where extreme maneuverability and heavy duty power is demanded, Harbormaster is best for the job.

Harbormaster Model O-41H, 30 h.p., gas power shown at left. (Model O-42, 40 h.p. diesel is similar in appearance.)

HARBORMASTERS proved in exhaustive use

Hundreds of Harbormasters are now in continuous, heavy duty marine work. Shown below is pusher type boat with 3 Harbormaster Outboard Units used for pushing 200-ton barge loads 25 miles up a shallow river . . . requires only 3 foot draft!



Here's why HARBORMASTER is tops

- **Easily installed for immediate use**
Can readily be installed on most barges, scows, towboats, tugs, derricks, lighters, etc. Is completely assembled and lined up in our plant.
- **Steers instantly in any direction with full power**
You get the ultimate in maneuverability with the exclusive patented M&T 360° Propeller Thrust Steering Control.
- **Underwater parts easily accessible for maintenance or repair**
Special 180° elevating mechanism allows one-man operator to raise entire submerged assembly to any degree he desires. No dry docking or diving to make repairs is necessary. Greatest maintenance efficiency of any heavy duty propelling and steering equipment.
- **Opens new shallow water fields to continuous operation**
Hulls with Outboard Propulsion can be designed for operation in shallow water where inboard powered hulls are impractical. Patented shear pin automatically shears off should underwater assembly strike submerged obstacle. Assembly rides over obstacle, free from damage, without loss of forward motion and operating power! New pin easily replaced while you are under way.
- **Economical to operate**
You realize big savings in fuel expense because you get more thrust per horsepower with outboard propulsion.

Specifications:

Sizes available from 20 to 300 h.p., gas or diesel power.

Model O-41H (illustrated)	
Engine H.P.	50
Engine R.P.M.	2300
Propeller diameter	30"
Propeller pitch	15"
Propeller R.P.M.	608
Fuel tank	16 gallons
Cooling	radiator
Height above deck	48½"
Width	36½"
Weight (dry)	2780 lbs.



Write today for catalog.

Write today for comprehensive catalog on Harbormaster Units. Catalog gives detailed data and valuable information, including over 70 photos and diagrams. Whether you have immediate or future use for Harbormaster Units, send for the catalog so that you will have full information on the advantages of outboard power.

MURRAY & TREGURTHA, Inc., 6 Hancock St., Quincy 71, Mass.

Remote-Reading Tank Gage



King Engineering Corp. announces the Keco remote-reading tank gage, for use with vented fuel oil, gasoline and diesel fuel tanks to 9 ft. depth. This gage shows the depth of fuel in inches, and is designed for use in commercial buildings, institutions, or wherever quick gaging is desired without going near the tank. It can be located near the furnace or wherever most convenient at any reasonable distance from the tank, and at any

desired elevation. The etched-aluminum scale plate has four different scales, to permit using the gage with fuels of a wide range of API gravities. Only one scale is visible at any time. If the grade of fuel is changed, the scale plate is readily turned to bring the proper scale into reading position. It is not necessary for the dealer to carry a stock for various fuels or order a special scale for each installation.

The Keco gage works as a frictionless hydrostatic balance, and has no moving mechanical parts except a small air pump built into the case. The case is of molded nylon, and cannot chip or corrode. All parts in the tank are steel, not affected by sulfur or other chemicals in the fuel. Installation consists only of mounting a ½-in. pipe in the tank, placing the gage on a wall or column, and connecting a ¼-in. copper tube from the tank to the gage. The gage is 8½ in. high x 2¼ in. x 2¼ in. overall. Full details on the Keco gage are given in illustrated Bulletin 375, available on request from King Engineering Corp., Box 310, Ann Arbor, Michigan.

DEMA Elections



A. W. McKinney

A. W. McKinney, executive vice president of The National Supply Co., Pittsburgh, has been reelected president of the Diesel Engine Manufacturers Association. The election took place at the annual meeting of the association November 12, 1953 at the Union League Club, Chicago. Other officers, also reelected are: Vice presidents: Walter A. Rentschler, vice president, Baldwin-Lima-Hamilton Corp., Hamilton, Ohio, and William E. Butts, president, Enterprise Engine and Machinery Co., San Francisco. Treasurer: Robert H. Morse, Jr., president, Fairbanks, Morse & Co., Chicago. Secretary: Harvey T. Hill. Mr. Hill is executive director of the association, which has offices in Chicago.

George W. Codrington, retired vice president of General Motors, will continue as honorary chairman of the association.

Mr. Kinney joined The National Supply Co. in 1920 and was elected to his present office in 1948. The company is a manufacturer and distributor of engines, oil field machinery and equipment, and steel pipe. Its engine division manufactures Superior and Atlas diesel engines and is sole distributor in the United States for certain of the Lister diesel engines, made in England. Other officers of the Association include the following: C. Paul Clark of Clark Bros. Co.; Guy J. Coffey, president, Chicago Pneumatic Tool Co.; M. C. Davison, vice president, Ingersoll-Rand Co.; Otto H. Fischer, president, Union Diesel Engine Co.; Robert E. Friend, president, Nordberg Manufacturing Co.; Thomas E. Hughes, general manager, Cleveland Diesel Div., General Motors; Gordon Lefebvre, president, Cooper-Bessemer Corp.; William S. Morris, executive vice president, American Locomotive Co.; E. J. Schwanhauser, executive vice president, Worthington Corp.

Torque Limiting Safety Clutch



A new safety device, to eliminate overloads and to reduce down-time in power drives, is introduced by Centric Clutch Company, Woodbridge, N. J. under the name of Centric Overload Trig-O-Matic Clutch. It features instantaneous trigger action in torque limitation and is ideally suited for speeds as low as one rpm. as well as for high speeds. The clutch, which provides permanent protection because of negligible wear of its parts, is easily adaptable to specific driving arrangements such as sprockets, pulley, belts, gears, etc. The operation

of the clutch is quite simple and positive in disengagement when a predetermined overload occurs and when the clutch is reset for further running of the drive.

The operation centers about two pawls; a driving pawl and a reset pawl, each of which are held in place by separate springs. Compression of these springs is controlled by their own screw and plug which permit necessary adjustments. The driving pawl turns about its pin and engages in a "V" in the driving rotor. Proper compression of the driving pawls load spring is controlled by a screw with access on the outer casing. The reset pawl is held on top of the driving pawl by a spring load that assists in controlling the action of the driving pawl.

Adjustments of this spring are made through its plug.

When the predetermined overload occurs, the driving pawl slides out of the notch in the driving collar. The reset pawl at this point engages the driving pawl in this released position and the power drive is disengaged. To resume operation, the reset screw is adjusted until the driving pawl is released. The machine will then resume operation at the exact cycle point of release. All Centric Overload Trig-O-Matic clutches will run in either direction. A new bulletin completely describing this clutch and furnishing a table of standard specifications is obtainable from Centric Clutch Company, Route 9, Woodbridge, N. J.

Here's How You Can Get LONGER LIFE FROM DIESEL ENGINES

- and... ▶ Eliminate Seat Distortion and Blow-by or Hot Spots Which Cause Valve Port Cracks!**
▶ Increase Valve and Seat Life Up to 300%!
▶ Greatly Reduce Valve Burning, Breaking, Sticking! Seat Stays Round—Cools Valve.

Heat expands seat with downward pressure locking together. Drawing below shows expansion clearance between threads.



INSTALL...



Peterson's
P-B Self-Locking
SCREW-IN
VALVE SEAT
with
EXPANSION CLEARANCE

NOW, FOR THE FIRST TIME...

A VALVE SEAT INSERT FOR ALL DIESEL ENGINES!

No Radial Pressure

Stress-Relieves Valve Port Area

Locks-In Can't Come Out

Precision Installation

Replace Without Going to Oversize

Distorted intake seats in some engines require excessive grinding to true up because exhaust expansion has pushed on one side—this problem is absolutely eliminated by P-B.

Whether your diesel engine was designed for replaceable valve seat inserts or not—even though head or block is normally hot welded—you can get longer life from your engine and suffer less costly down-time by installing P-B Screw-in seat inserts... made of heat-treated Chromite material to retain its shape, wear longer.

Performance-tested in Diesels for over 15 years in Canada and the U.S., this new valve and seat maintenance program has proved its value in eliminating distortion around valve seats providing a perfectly round seat which allows valve to cool properly thus increasing valve mileage. 75% of the heat developed in valves is dissipated by transfer through valve seat to engine coolant.

Because the P-B seat is designed with expansion clearance and will not cock, buckle, or distort, valves seat perfectly on every stroke and will not bounce, flutter, burn, break or stick.

Whether your problem is head or block cracking around valve ports; valve burning and breaking; or costly, time consuming hot weld seat replacement—you can save money and trouble by installing P-B Screw-in Valve Seats with expansion clearance. Good pressure tested, laced up cold welds in valve port will not open up because P-B seat stress relieves the hottest point in the engine.

INSIST ON P-B ... Seats available for all Diesel engines including Sterling, Nordberg, Superior, LeRoy, Budo, Waukesha, GM Cleveland, Alco, Cummins and Cooper-Bessemer. Standard sizes in steps of $\frac{1}{16}$ " from $1\frac{1}{16}$ " to $4\frac{1}{16}$ " O.D. Larger sizes on request.

Contact Your Master Shop — now located in every major city in the U.S. If your engine maintenance shop can't supply, write direct to:

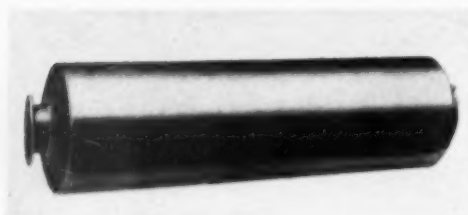
PETERSON WELDING LABORATORIES, INC.

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LEADERS FOR 20 YEARS IN HEAD AND BLOCK VALVE PORT WELDING PROCEDURES.



Improved Intake-Exhaust Silencers



Two new series of silencers for quieting the noise produced by air compressors, blowers, vacuum pumps and other machines expelling high velocity air to atmosphere have been developed by Burgess-Manning engineers. To be known as the Series "CA" and "LCA," they are designed for operation

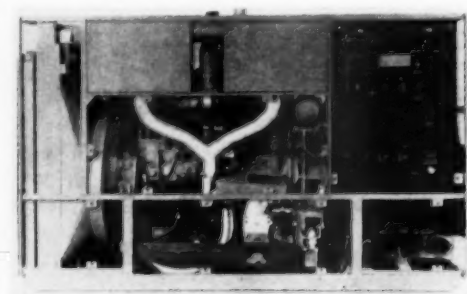
under moisture-free air conditions and for temperatures up to 200° F. Both series are absorption type silencers employing straight-through acoustically transparent perforated tubes surrounded by a deep layer of special, highly efficient, sound absorbing material, and therefore, feature minimum restriction to air flow. Special sound absorbing material can be used for operation at considerably higher temperatures than the standard of 200° F. The "CA" Series is available in pipe sizes up to 6 in., whereas the "LCA" Series is available in sizes larger than 6 in. These new developments compliment the extensive line of silencers and snubbers of the Burgess-Manning Company, which range from small units slightly larger than the human hand up to giants measuring 75 feet in

length. As the manufacturer states—"We are intake and exhaust noise silencing specialists." Literature is now available on both the Series "CA" and "LCA" and may be had by writing directly to H. A. Dietrich, Burgess-Manning Company, Libertyville, Illinois.

Kansas City Manager

John R. Hamill has been appointed manager of the Kansas City district office of Worthington Corporation according to an announcement by T. J. Kehane, assistant vice president and general sales manager. He will succeed Paul J. Foley who has been appointed general sales manager for Worthington's Plainfield (N.J.) Works' products. Mr. Hamill joined Worthington in 1937 after graduating from Northwestern University. After assignments as estimator in the Oil Field Product Division at Harrison and sales engineer attached to the Buffalo (N.Y.) Works, he was appointed, in 1944, Gulf Coast manager of the company's marine division. From 1950 until the present, he has served as manager of Worthington's Wilmington branch office.

Lightweight Generator Set



The Hercules Model DIX6-D, 6-cylinder diesel engine, has been selected to power the O'Keefe and Merritt diesel-generator set PU-211/G. The PU-211/G is a light weight 20 kw generator set. While this unit is rated at 20 kw, it is capable of producing 25 kw continuous output. Many exacting specifications have been placed upon the Hercules diesel engine. The set is designed to operate efficiently in temperatures ranging from -65° F. to 131° F. Further, the Hercules diesel, DIX6-D must perform properly from sea level up to 6500 ft. altitude. In addition to the above specifications, the complete unit is air transportable and does not exceed 2200 pounds dry weight.

Service life of 24 hours a day with only normal maintenance—not major overhaul, for a period of 105 days, is also expected of the Hercules diesel powered generator set. In order to facilitate minor repairs and adjustments, all engine accessories, except the starter, are mounted on the left side of the set. This provides easy access for routine service and inspection, particularly in installations where space is limited.

YOUR COPY OF DIESEL ENGINE CATALOG in its eighteenth completely re-edited, revised and expanded edition is now off the press. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this latest edition now. Profusely illustrated. \$10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.



GIANT DIFFERENCE helps cut diesel maintenance costs!

Only **D-X Diesel Motor Oils** contain Extrinol. And Extrinol is the giant D-X difference that can make a giant difference in your diesel maintenance costs.

Extrinol helps D-X Diesel Motor Oils stand up longer. It increases their stability, their protective and lubricating qualities so they give you longer service. That means quite a saving in itself.

D-X Diesel Motor Oils — thanks to Extrinol — lengthen engine life. It's not unusual to hear of D-X lubricated engines traveling a quarter-million miles with only one overhaul. It's no surprise to learn that pistons, bearings and cylinder walls — when properly lubricated with D-X — show practically no wear even after years of 12 to 15 hours of service a day.

We're so certain D-X Diesel Motor Oils with Extrinol will cut your maintenance costs, we'll give you your money back if D-X doesn't satisfy you completely. If you live in the Midwest, contact your D-X salesman or write the office nearest you.



Diesel Motor Oils

MID-CONTINENT PETROLEUM CORPORATION

TULSA, OKLA.
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Waterloo, Ia.
Chicago, Ill.

Terre Haute, Ind.
Minneapolis, Minn.

District Sales Representatives



Earl Genn



Frederick D. Logan

The appointment of Earl Genn and Frederick D. Logan as district sales representatives in the Chicago area, has been announced by Lewis L. Dollinger, Jr., sales manager of the Dollinger Corporation, Rochester, N. Y., manufacturers of Staynew Filters for industrial and commercial use. Born in New York City, Mr. Earl Genn has been identified with sales engineering activities for a number of years in the midwest. He was formerly sales engineer for the Furkert Company. Mr. Frederick D. Logan, native of Forest, Virginia, is a graduate of the University of Illinois with a Bachelor of Science degree in mechanical engineering. He is a member of Triangle fraternity. Prior to his association with Mr. Genn, Mr. Logan served as a mechanical engineer for various firms. He is a member of American Society of Mechanical Engineers and the Western Society of Engineers.

Cummins Branch



New Cummins service and sales branch at Bakersfield with chassis dynamometer in foreground and maintenance area at right.

The new Cummins Service and Sales Branch at Bakersfield, California was placed in operation during the first week of November, according to J. H. Flanagan, president. This facility which includes 15,000 sq. ft. of shop area located on eight acres, serves Cummins engine owners in Kern County as well as those passing through the southern part of the San Joaquin Valley needing road service and shop facilities. The new Bakersfield plant includes large and complete maintenance department, engine rebuild section, both chassis and engine dynamometers, large chassis shop for minor repairs and adequate parking for both equipment to be serviced and customers' automobiles. The new facility is under the direct management of Earl Swallow. George Hedstrom is in charge of sales and engineering, and Cliff Woods is shop superintendent.

Due to the new facilities, the parts inventory has been greatly enlarged in order to expedite repairs of every nature. "The completion of our new plant at Bakersfield is another step in a complete modernization program of all of our facilities," S. B. Cook, vice president of the Cummins Service and Sales stated. "The increasing importance of the Bakersfield area as a center for the use of Cummins diesel engines has already resulted in the greatest percentage of our new facilities at Bakersfield being

used and the building was planned so that additional working areas for the shop, engine rebuilding, and parts inventory could be easily added." As an additional service to Cummins engine owners, a night shift has been added so that repair service, road service, and parts are now available from 8:00 a.m. to 12:30 a.m., according to J. R. Neal, general manager. Cummins Service and Sales is the Cummins dealer for all of Southern California and Southern Nevada.

Diesel Driven Welder

Newest addition to the Hobart "Multi-Range" welder line is a diesel engine driven arc welder of 300-ampere capacity, especially designed for locations where electric power is not available and a

minimum operating cost is desired. It is powered by a General Motors, 2 cycle unit injection diesel engine, that features oil cooling, displacement blower, fuel filtration and easy starting. The engine has a piston displacement of 141.8 cubic inches and is rated at 67-hp. at 1500-rpm. Equipped with patented "Multi-Range Dual Control" and exclusive remote control, this new welder permits the operator to make fine voltage-ampere adjustments right at the work, eliminating unnecessary steps from the work to the machine and back again. Its 1,000 combinations of voltage and ampere permit the operator to select the right arc intensity to suit any job. Other features include separate excitation and two-way ventilation for a smoother, more productive arc at all current values.

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STANDBY POWER
PORTABLE POWER

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... now offers world-wide distribution of their complete line of alternators from 5 KW to 150 KW. Compact and self-regulating, their simplicity of design permits low original and maintenance cost. Equipped with a time-tested flexible coupling and standard SAE adaptor, they permit easy assembly and positive alignment with all standard diesel, gasoline, butane and natural gas engines.

**Flexible Coupling
Standard
SAE Adaptor
Simplicity of
Design
5 to 150 KW**

A FEW SELECT TERRITORIES ARE STILL AVAILABLE TO PROGRESSIVE DISTRIBUTORS • INQUIRIES INVITED



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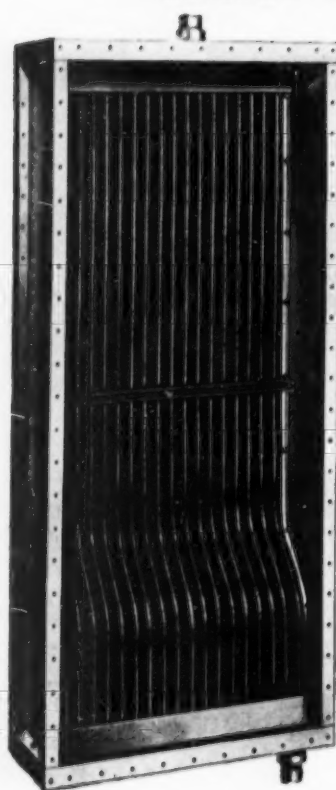
Complete with engineering data, accessories and information on the use of alternators.

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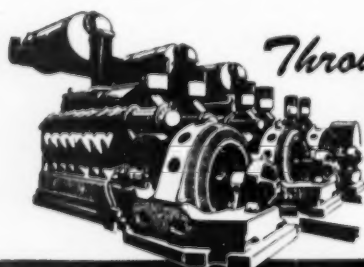


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*Aerofin is sold only by manufacturers of
fan-system apparatus. List on request.*

Injector Tube Service Set



Time and effort required to recondition diesel injector tubes is drastically reduced by the use of a new diesel injector tube service set just announced by the Kent-Moore Organization, Inc., manufacturer of special automotive service tools and equipment. Developed in cooperation with the Detroit Diesel Division of General Motors Corporation and designed especially for use on GM diesel engine models No. 2, 3, 4, and 6-71, these new tools not only speed the service operation but give results that closely approximate original factory installation, according to the manufacturer. The set, which is pictured here, includes all the tools necessary for performing the entire injector-tube reconditioning operation, from removal of the old injector tube, through installation, flaring, and reaming, to re-finishing of the new tube, in accordance with factory-recommended procedures. Known as Kent-Moore Tool Set No. J 5286, the set includes: tap, tap holder, tap driving rod, installer body, installer pilot, installer flaring die, first-operation reamer, second-operation reamer, and tube-tip refinisher. All come packed in a sturdy, light weight metal box for convenient on-job handling. The set may be ordered or literature concerning it obtained by writing direct to the Kent-Moore Organization, Inc., 5-105 General Motors Building, Detroit 2, Michigan.

Allis-Chalmers Catalog

A new two-color photo-album type market catalog, "Logging With Allis-Chalmers" has been published for the logging and sawmill industries by the Tractor Division of the Allis-Chalmers Manufacturing Co., Milwaukee 1, Wisconsin. The catalog directs attention to the versatility of crawler tractors, motor graders, motor scrapers, and power units, with approved allied equipment. The booklet outlines advantages to the industry of mechanized operations made possible through the use of modern equipment. New and speedier methods of handling old jobs such as building and maintaining access roads, reforestation and work at the sawmill, are spotlighted by the illustrations. Stressed also is the economy factor provided by such things as operator comfort, expanded output of each unit, and less "down time" while on the job.

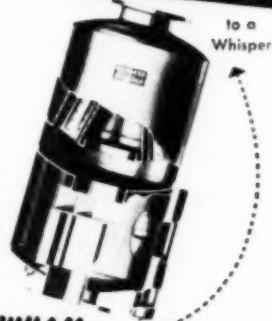
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Noiseless, smoother, safer operation are prime specifications of every Burgess-Manning Marine Snubber. Every one is engineered to the specific problem of maximum engine performance of completely dissipating the energy of exhaust gas slugs—therefore, quiet efficiency. Every one is built to render lasting satisfaction under severest conditions. There are no obligations for recommendations—send us a description of your problem.

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EXHAUST SNUBBERS



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CENTRIFUGAL governors
give you exact R. P. M. control
... at
LOWER
COST



For more than 40 years Pierce has specialized in the speed control field. Pierce Centrifugal Governors, engineered specifically for your Diesels, give accurate, dependable control of engine RPM to meet the varying conditions of any job. Pierce Governors are standard equipment on many of America's finest diesel engines... assuring maximum protection, dependable performance—at lower initial and maintenance cost. Replacement governors and parts are available through your local distributor or fuel injection service station.



For distributor's name or information on special governing problems, write

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BIG NEWS

FOR ALL DIESELS!



FRAM completely removes water from diesel fuel with NEW WATER SEPARATOR & FUEL FILTER

- ✓ 100% Water Removal! ✓ Traps Dirt and Dust!
- ✓ Cuts injector maintenance costs!
- ✓ Reduces down-time!

The new FRAM Water Separator & Fuel Filter is a double-action filter for complete injection system protection—

1. Saves costly injectors from corrosion, rusting and pitting... removes all water!
2. Micronic filtration traps dangerous dirt before it reaches injectors... ends abrasive action!

Save the cost of replacing expensive injectors! Guard your diesels for longer life... less wear... fewer repairs—with the new FRAM Water Separator & Fuel Filter! For specific installation information write: FRAM CORPORATION, Providence 16, R. I. Fram Canada Ltd., Stratford, Ont.

IMPORTANT!

Diesels already equipped with FRAM Fuel Filter need only the Water Separator Filter and a new FRAM Coalescer Cartridge for 100% water removal!



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HERE'S WHY

Stewart & Stevenson specializes in service. Because we feel that engines are no better than the parts and service organization behind them, our repair department is ready 24 hours a day to give you fast, dependable service when you need it. And Stewart & Stevenson's experience in engineering more different types of diesel engine applications than any other engine distributor gives us the know-how to handle your job right. Call us. There's a branch less than two hours from your operations.

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Florida Diesel News

By Ed Dennis

AT POMPANO Beach the Florida Georgia Tractor Co. of Miami delivered a Northwest model 25 dragline, powered with a 4 cyl. Murphy model 11 diesel rated at 100 hp. to Zinle-Smith for general contracting work.

YACHT *Aras* repowered with two model 6-110 General Motors diesels, 3:1 reduction gears and GM hydraulic clutch at the boat slips of Florida Diesel Engine Sales, Miami; also at the same dock the *Miss Tas Tee II* of Cleveland with two series "71" GM diesels.

NINETY-FIVE FEET, 95 tons and Cummins powered were the 4 new Coast Guard cutters built at the Coast Guard Yards, Curtis Bay, Md.; each powered with 4 model V.T. 600, 2200 hp. Cummins diesels; cost approximately \$475,000, stopping at Florida ports enroute to the West Coast.

J. I. DAVIS, special agriculture representative and Charles R. Beck, earthmoving representative for the Caterpillar Tractor Co., have been assigned to the Eastern Sales Division. Both men will work with Caterpillar distributors in Florida, conducting demonstrations and other field activities.

NEW additions to the diesel equipment at the Red Road Rock Pit were the 3/4-yd. Lima dragline powered with a 6 cyl., 150 hp. Buda and a 1 1/4-yd. Bay City dragline with a 6 cyl. Cummins 200 hp. diesel.

THE *Evangeline* is the first shrimper launched from the new St. Johns Boat Yard in St. Augustine, measuring 70 by 19 ft. and powered with a model D 337 Caterpillar. The vessel makes 14 knots with ease.

A 10 KW. Nordberg diesel generating set for the newly constructed coastal tug *H. A. Wood*, supplied by J. Frank Knorr of Miami; main propulsion is a model D 397 Caterpillar diesel rated at 400 hp.

A BUDA diesel model 6-D.T.-468, six cylinder in the new model L.D. 11 Scoop-mobile used by A. E. Collins, contractor for road construction.

THE CORPS of Engineers, Jacksonville will have 3 Nordberg Radial model R.T.S. 1411 diesels rated at 1655 hp. at 400 rpm. installed in pumping station #9 on Canal 11 and Levee 37 near Fort Lauderdale. The pumps are from the Morris Machine Works. Vertical axial-flow; 960 cfs. at 10.4 ft. head, 122 inch dia. impeller.

THE *Jeremie* is the first of six 65 ft. cargo vessels being built by Compania de Industria Maritimas S.A. for use in Cuban and Haitian coastal service; powered by twin General Motors diesels series 71.

DIESEL BRIEFS: A pair of GM 110's in the *Atlantic Explorer*, a converted air-sea rescue craft. . . . A Waukesha diesel in the *Benson Rigger*, a menhaden fishing vessel. . . . And the *El Toro* with two 6-71 GM's to do towing on Lake Maracaibo.

Turbocharger Specialist



Walter H. Leeman

Mr. Walter H. Leeman, turbocharging specialist, has recently joined the staff of the Brown Boveri Corporation. Mr. Leeman was born in Switzerland. He attended school there, graduating from the Federal Institute of Technology with the degree of Mechanical Engineer. From 1949 to 1951, he worked with Brown Boveri and Company, Ltd., of Baden, Switzerland. He subsequently came to the United States and obtained his Master's degree at the Georgia Institute of Technology in Atlanta. In 1952 until he came to Brown Boveri, he was with the Elliott Company. Mr. Leeman is the recipient of the Research Award of the Sigma Xi Society for work in the field of internal combustion engines.

Reclaiming A "White Elephant"



It's diesel vs. "white elephant" near Tracy, California as a Caterpillar D8 tractor-bulldozer converts a deep abandoned oil storage tank into some 25 acres of profitable farming land. Paul Bouillin, a general contractor, has the job of tearing out the high, concrete-lined embankment around the storage pit and spreading the material over the tank floor, which is roughly 1,200 feet long and 600 feet wide.

The tank, called the world's largest, has an inside depth of over 30 feet and it is reported to have cost \$1,000,000 when it was constructed back in 1926 to hold 3,500,000 barrels of oil for the western division of the Southern Pacific Railroad. It was shaped from flat land by mules, men and scrapers, with work going on day and night. This reservoir was in use until 14 years ago when it was idled, a subject of controversy as to what could, or would, be done with it.

Paul Bouillin started work on the "white elephant" late October and expects the job will take at least three months before the D8 will have moved an estimated 200,000 cubic yards of concrete and embankment earth to convert the hole in the ground into a stretch of level, productive earth. At one time guarded around the clock, the abandoned oil tank is surrounded by one-half inch copper cables, leading to four 200-foot lightning rod towers located at various points around the embankment.

Oil and Gas Power Division Meet

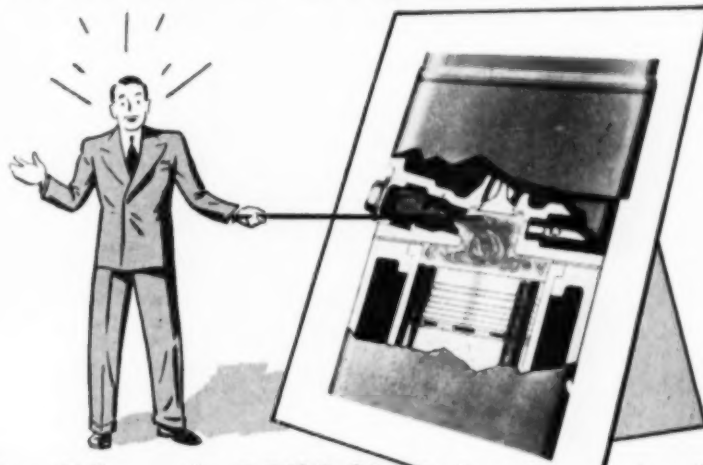
Diesel accessory suppliers are looking forward to the 1954 Kansas City Convention of the Oil and Gas Power Division of the ASME and many are planning to exhibit at this Annual Diesel Meeting. Reservations are being made in anticipation of the large number of engineers who will be in attendance from big diesel operating plants in the region such as municipalities, public utilities, pipeline pumping stations and, of course, many engineers direct from the engine manufacturers. Joseph Clark c/o ASME, 29 West 39th Street, New York City, is handling space reservations in the exhibit section of the Muehlbach Hotel for June 14 to 17 when the convention will take place. Prospective

exhibitors are urged to contact Mr. Clark without delay for space reservations.

F-M Diesel-Electrics Ordered

Fairbanks, Morse & Co. has received an order from the Virginian Railway Company, Norfolk, Virginia, for twenty-five diesel electric locomotives, according to Robert H. Morse, Jr., president. Total cost is approximately \$5,000,000. The locomotives will be used for the dieselization of the west end of the railroad. They consist of nineteen 2400 hp. Train Masters and six 1600 hp. general purpose road switchers. They will be manufactured at the Beloit, Wisconsin Works of the company with delivery starting at an early date.

Are you one of the combustion-wise, dollar-wise Diesel buyers who asks...



"Does it have the LANOVA combustion system?"

The smart diesel buyers of today realize it pays big dividends to ask this all important question, and rightly so! It's a proven fact that high speed diesels using the Lanova combustion system offer many money-saving advantages not available in ordinary diesels.

For example, in diesels that use the Lanova combustion system, the unique and scientifically designed Lanova energy cell creates a violent rotary turbulence in the cylinder. This assures the thorough mixture of fuel

and air needed to assure complete, efficient combustion. The cell also isolates and cushions the initial jarring impact of high combustion pressures and feeds them back to the cylinder in the form of smooth working pressures. This timing and control function provides maximum useful power during the working stroke of the piston.

The result is smoother diesel performance, with lower maintenance and operating costs.

Write for the LANOVA story

This 58-page handbook contains complete information about the efficient, money-saving Lanova Combustion System. Send for your free copy today.

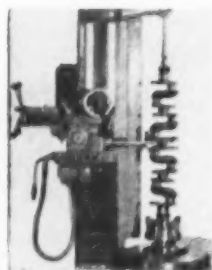


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One of America's foremost names in diesel research and development

Re-Grinding Machine



De Buyer Vertical Castle Machinery Company announces the De Buyer vertical crankshaft re-grinding machine, available in three sizes: Type J. M. 1500 illustrated, has a capacity of 64" between centers. It will handle all automotive, truck and aircraft engine crankshafts without removal of the counterbalances. Type E300-75 has a capacity between centers of 118 inches. Type D350-90 has a capacity between centers of 138 inches. A

unique feature of these machines is the very small floor space required. The small machine illustrated needs only 52 inch x 36 inch and the largest machine, only 72 inch x 52 inch. Because of the vertical grinding position, counterbalancing is not required, and setup time is reduced to a minimum. Torsion is eliminated and perfect alignment is assured. The machine illustrated requires only 2 3/4 horsepower. Write for further information to Castle Machinery Company, P. O. Box 310, New Castle, Pa.

Director of Public Relations

Ted Palmer has been named director of public relations for Pacific Intermountain Express, it was

announced by Parkman Sayward, vice president of sales and traffic. He will headquarter in the trucking firm's general office in Oakland. Mr. Palmer goes to Pacific Intermountain after resigning from the Henry J. Kaiser companies' public relations department where he had been assigned to Kaiser Engineers. In his new assignment he will be responsible for P-I-E's public relations and publicity along the routes of the company's system, stretching as far East as Chicago, with equipment operating from Los Angeles and the San Francisco Bay Area through Salt Lake, Denver, Kansas and St. Louis.

Receives Award From President's Committee



Gordon Lefebvre, President of Cooper-Bessemer, receives the NEPH Committee award from Rose Michaux, manager of the Mount Vernon office of the Ohio State Employment Service.

The Cooper-Bessemer Corporation of Mount Vernon, Ohio, recently received an award from President Eisenhower's Committee on National Employment of the Physically Handicapped, for its outstanding record in providing jobs for the disabled. Gordon Lefebvre, president of Cooper-Bessemer, received the award from Rose Michaux, manager of the Mount Vernon office of the Ohio State Employment Service. In presenting the award Miss Michaux commented on Cooper-Bessemer's "deep and sincere interest in the welfare of the physically handicapped worker." She noted that of the 307 veterans employed in the Mount Vernon plant, 31, or 10 per cent, were disabled. Miss Michaux also cited Cooper-Bessemer's pioneering work in establishing a policy of selecting disabled veterans for an apprentice program, observing that in 1946, 17 disabled veterans started work in an apprentice class at the Mount Vernon plant. In accepting the award, president Lefebvre stated his conviction that the policy for which Cooper-Bessemer had received the award had proved its worth in helping the company meet its many obligations. "These disabled men," stated Lefebvre, "are making a splendid account of themselves in helping us maintain our production and high standards of accuracy in the manufacture of engines and compressors."

Joins American Bosch

Charles W. VanOverbeke has joined American Bosch Corporation as field engineer in the firm's Chicago branch office according to an announcement by Donald H. Spicer, vice president in charge of general sales.

Eaton Parts for Diesel Engines



have a background of years of cooperation with the Diesel industry

Eaton is proud to have served as supplier to leading Diesel engine manufacturers for many years—furnishing valves, free-valves, lash adjusters, valve seat inserts, cam followers, bolts, studs, and other precision

parts. This close cooperation with the Diesel industry has given Eaton engineers a thorough understanding of the requirements of specific engines, so essential in solving valve-train and other problems.

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PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater-Defroster Units • Snap Rings • Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamic Drives, Brakes, Dynamometers

3 WIRKKALA PROPELLERS

On the Tug
INLAND CHIEF



Three new 50 x 29 in. 3-bladed Wirkkala Propellers have been installed on the Inland Navigation Co.'s tug INLAND CHIEF. The Inland Navigation Co. is one of four affiliated companies operating on the Upper Columbia and Snake Rivers.

The INLAND CHIEF is the 5th high powered river tug owned by this group of companies to be fitted with Wirkkala Propellers. The vessel is powered by three 1,000 hp. Enterprise Diesels and is skippered by Capt. A. Leppaluoto.

A preliminary statement by the Inland Navigation Co. says that the Wirkkala Propellers have "greatly reduced vibration . . . operation in swift waters with more push and less rpm's."

Invented by Oscar Wirkkala, the Wirkkala Propeller has been tested under the severest operating conditions and has proved itself the most advanced propeller in use today. Protected by world patents.

WIRKKALA PROPELLER SALES, INC.

Naselle, Washington

Phone: Naselle 541

California Sales Office: 1900 Park St., Alameda, Calif.



DIESEL ENGINE CATALOG

The purpose of this little advertisement is to tell you about Volume 18 of DIESEL ENGINE CATALOG which is now available, entirely revised and rewritten. This is the 18th edition of the book that has earned the name of "the bible of the industry."

All smart diesel engine salesmen carry this book around in their car. When they run into some new competition with which they are not too familiar, the DIESEL ENGINE CATALOG gives them full, accurate information when they need it most.

The consulting engineer keeps this book in his reference file. It immediately gives him all data on diesel engines coming within a given horsepower range, speed range and weight range.

People who sell, people who buy, people who use diesel engines need this new, fully illustrated, up-to-the-minute volume. It has been completely revised and expanded. Orders are now being accepted for this latest edition. Price \$10.00 prepaid.

Add California Sales Tax for Delivery in That State

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816 N. LA CIENEGA BLVD.
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WANT TO CUT FILTERING COSTS?



• LOWER
ORIGINAL COST

• SIMPLE, INEXPENSIVE
TO INSTALL

• NO EXPENSIVE BACK UP
SUPPORT REQUIRED

• PERMANENT
TYPE

• HIGH FLOW RATE
(EITHER DIRECTION)

• EASILY
CLEANED

It seems hard to believe, but you can actually have more efficient filtration at considerably lower cost if you simply use Bendix-Skinner ribbon elements instead of expensive and less adaptable metal edge or metal screen types.

Here's how it works—Bendix-Skinner ribbon elements are inexpensive to begin with and can be installed at far less cost than metallic elements that require special back up supports. In fact, in practically every instance present metallic-type elements can be changed over to ribbon-type with substantial savings.

Ribbon units are available in diameters from $\frac{1}{2}$ " to 6" in any required length with filtration rated at 40 microns (.0016").

Our engineering department will be glad to advise on new installations or to furnish replacement units in a variety of sizes. Write us for details.



DIESEL ENGINE CATALOG

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A SIGN POST

... pointing the way to fact-finding and time-saving in the selection of diesel, dual-fuel or gas engines for your particular application. Your source of information, to be of any value to you, must be up-to-date. It must include all the latest facts and figures. That is why you need the latest edition of DIESEL ENGINE CATALOG on your desk, at your fingertips.

VOLUME 18

The diesel industry is fast growing and competitive. New engines and improvements on older models are constantly being announced by the builders. Your reference must be as up-to-date as the engines on the market. DIESEL ENGINE CATALOG is that kind of reference book. Unless you make use of the latest edition, Volume 18, you are not getting the information you want and need. Products of every major engine manufacturer are described and illustrated in Volume 18. Specifications are included.

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If you use, buy, sell or service diesel, dual-fuel and gas engine, or write specification on their applications, Volume 18 of DIESEL ENGINE CATALOG is your book. Over 400 pages of vital engine and accessory information is yours for only \$10.00. DIESEL ENGINE CATALOG, Volume 18, is a big book from every standpoint. Its large 9-inch by 12-inch pages are easy to read. Its index makes the information you want easy to find.

Be sure of your copy. Send in your order now!

Exhibit at ATA



Lined up for inspection by registrants of the American Trucking Association's annual convention, held recently in Los Angeles, are five different makes of trucks, all powered by 150 horsepower Model JBS-600 Cummins Diesels. This special exhibit was staged by Cummins Engine Company, Inc., Columbus, Indiana, through the cooperation of Autocar, Diamond T, International Harvester, Reo, and White during the ATA. One of the trucks was given away in a drawing. The winner was J. Robert Cooper, Red Star Transit Co., Detroit, Michigan, whose winning coupon entitled him to a JBS powered Reo. Parked on the street is a 1953 Ford Sunliner Convertible, which was presented to an ATA lady by the world wide dealer organization of Cummins diesels. The winner of this drawing was Mrs. Frank Campbell, Campbell 66 Express, Springfield, Missouri. Other features of the exhibit included, the Cummins 1952 Indianapolis 500-Mile race car; a JBS-600 cutaway, and an experimental truck.

Brochure Describes Alumibonding

The complete story of the many successful applications of Alumibonding is described in an 8-page fully illustrated booklet issued by Arthur Tickle Engineering Works. This patented process of molecular bonding of aluminum and its alloys to iron, steel and their alloys is being used extensively in hundreds of applications where weight reduction is an important requirement. Other Alumibond advantages include greater free machinability, corrosion resistance, and better thermal conductivity. Since pure aluminum has approximately five times the thermal conductivity of steel, heat dissipation is an important application. Of particular interest to design and production engineers, the booklet describes how superior bearings are obtained through the coupling of the well-known bearing qualities of aluminum (sometimes alloyed with tin, nickel and copper) to the strength, resilience and fatigue resistance of steel.

Alumibond coating of steel has proved to be outstanding in resisting oxidation at high temperatures. Indications are that aluminum-clad cast iron or steel pistons will greatly reduce maintenance costs and improve performance of heavy duty diesel and gas engines. Copy of this newsworthy, informative brochure on Alumibonding may be obtained from Arthur Tickle Engineering Works, 25 Delevan Street, Brooklyn 31, New York.

DIESEL PROGRESS

816 No. La Cienega Blvd., Los Angeles 46, California

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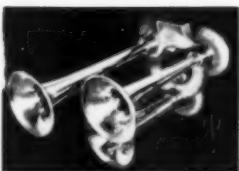
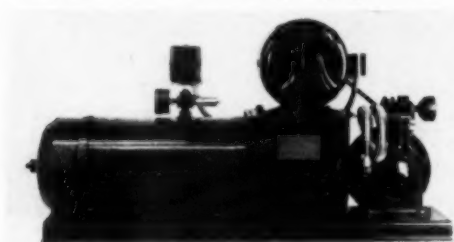
NAME _____
TITLE _____ COMPANY _____
ADDRESS _____
CITY _____ ZONE _____ STATE _____

Golden Jubilee Show

Fifty years of growth from the naptha launch to sleek express cruisers and fifty years of expansion from a handful of wealthy owners to millions of recreational boating enthusiasts who fish, vacation and in other ways derive pleasure from their craft. That is what has happened to boating in the past half century.

The National Motor Boat Show for 1954 will therefore have a Golden Jubilee theme. It will be held in New York City's Kingsbridge Armory January 15-23 in the Borough of the Bronx. This colossal building has the largest expanse of unobstructed, roofed-over floor space, the equivalent of four football fields. All exhibitors, as a consequence will have first-floor displays. Under the sponsorship of the National Association of Engine and Boat Manufacturers, this month's Show will prove to be the finest in a history of fine Shows.

Airhorns and Accessory Equipment



Kahlenberg Bros. Co., manufacturers of diesel engines, propellers, and airhorns, has added to its highly diversified line of airhorns for 1954 in offering additional

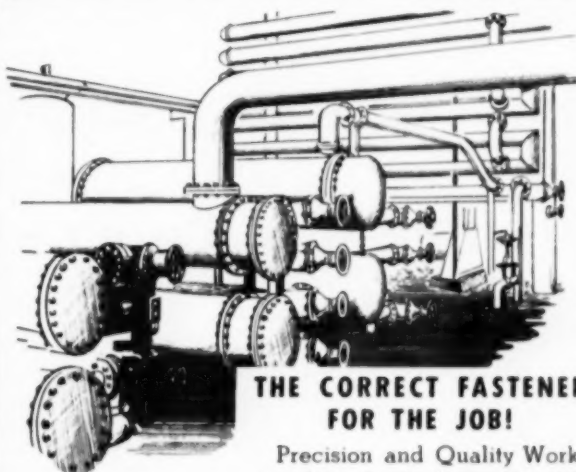
accessory equipment for use with its airhorns such as automatic air compressor units and compressors suitable for driving through power-take-off from main propelling engines on vessels not otherwise equipped with compressed air apparatus.

For pleasure and work boats up to 75 feet, Kahlenberg offers its KBC-1 3E automatic air-cooled air compressor unit in 24, 32 and 110 volt dc. and 110 or 220 volt ac. Due to the extremely low air consumption of Kahlenberg airhorns, this small and compact compressor unit has been found adequate for use with Kahlenberg airhorns as large as the triple chimetone having diaphragms 5-in. and 6 $\frac{3}{8}$ -in. as well as single monotones up to 8-in. size. Additional storage tanks are available if desired. Larger units, also air-cooled, are available in various voltages. Also power take-off units having displacements from 2 to 9 cubic feet/minute are offered together with accessory items such as valves, gauges, A.B.S. air tanks and items of similar nature. All units are built of non-magnetic, non-corrosive materials especially for long life in marine service.

Especially designed timers too are offered for automatic electrical operation of Kahlenberg airhorns where desired and in accordance with pilot rules for various waters. Bulletins on Kahlenberg airhorn equipment are available. Write Kahlenberg Bros., Two Rivers, Wisconsin and mention DIESEL PROGRESS.

JANUARY 1954

For DEPENDABILITY IN REFINERY EQUIPMENT



THE CORRECT FASTENER FOR THE JOB!

Precision and Quality Workmanship, backed up by 38 years of Erie experience, are yours for thoughtful buying. Whether you require a fastener made from carbon, alloy or stainless steels, to special design, to exacting specifications, Erie fasteners will save you time and expense... from your planning, to procurement, to fabrication. Submit your fastener requirements to us, Erie Service will meet the challenge.



ERIE BOLT and NUT CO.
ERIE • PENNSYLVANIA

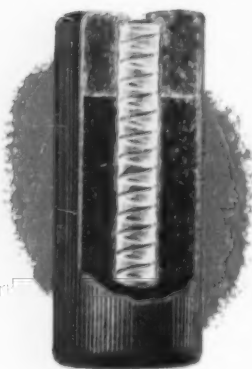
STUDS • BOLTS • NUTS
ALLOYS • STAINLESS
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Representatives in Principal Cities.

PROTECTED



right from the start



Starting time is toughest for engines, too. That's when they really need protection. When the lube oil is cold and viscous many filters won't accept it... send it through the by-pass without any filtration. Then, if the oil has been contaminated, or any part of the engine fails, there is no protection for critical surfaces. The power plant goes down... and repair costs go up.

You can use Winslow full-flow filters with complete assurance that oil will be filtered... Hot or Cold... right from the start. Winslow's exclusive CP* design provides automatic pressure regulation within the element, so that oil is by-passed only under emergency conditions. CP construction gives greater porosity near the outer edge, so that large particles are trapped first. Smaller contaminants are removed as the oil passes through denser filtering media near the center. This progressive filtration is clearly superior to any element that traps all sizes of particles on the outer surface, which becomes clogged and reduces the capacity of the filter.

*CP is the title of a helpful and informative booklet available from Winslow Engineering Company. Why not write today for your copy?



WINSLOW FILTERS

Winslow Engineering Company 4069 Hollis Street • Oakland 8, California

WINSLOW NEWS NOTE

All the Nordberg Pumping engines on the Trans-Mountain Pipeline are *protected right from the start* with Winslow CP* full-flow lubricating oil filters, and treated Free-Flo crude oil filters.

Inland River Reports

By David I. Day

WE NOTED the new *Inwaco* of the Federal Barge Line, Inc., working well on the Illinois River recently. She is powered with twin Nordbergs rated at 1800 hp. Observed also were the many items nationally advertised which are used in the boat's equipment, including DeLaval pumps, Nugent filters, Elliott strainers, and Burgess-Manning telephone equipment.

THE *A. H. Truax* of the Mississippi Valley Barge Line had the most impressive grain tow we saw on the Mississippi this month. The tonnage was reported as 12,000. This boat built in 1946 has Superior twins, about 1650 total hp.

C. E. BROOKS and Joe Thomas were the two proud engineers on the 5000 hp. *Allied-Ashland* of the Ashland Oil & Refining Co. fleet. This is one of two boats rated as the most powerful of all river towboats. She was pushing 130,000 barrels of oil up the Mississippi on very low water.

IT WAS a pleasure in November to see again the well-built *Sarah Kate* of the Hill City Towing Company, Vicksburg, Miss. She has twin General Motors engines totaling 1800 hp. It is said the hull measures only 80 feet in length but back of barges she looks longer. Capt. Phil Marionneaux was in charge of the upbound boat.

THE FAIRBANKS-MORSE people can be truly proud of the engine room aboard the brand-new boat still unnamed at last account but ready for launching at the Calmes Shipyard in New Orleans waters. This boat with its 800 hp. F.M. engine is to go to owners at Tampico, Mexico. The performance of this boat will be worth a paragraph or two a year hence.

THE COYLE Lines, New Orleans, like the work done at the Arnold V. Walker Shipyard, Pascagoula, Miss., and make no bones about it. This concern is now using the fourth boat of recent vintage bearing the Walker brand. She is the new *Mobile*—a very lovely craft—using twin Fairbanks-Morse units totaling some 1200 hp.

WE WERE a little bit astonished to see the neat *Cornell* of the Union Barge Line at work on the upper Mississippi—a pair of Superiors give this vessel 2800 hp. The boat was built back in 1945 and is in dimensions, 176 x 36 x 10.

NICE COLOR snapshot showing the repainted *Patsy Hillman* of the Hillman Transportation Co., Pittsburgh came on Nov. 24 from Mrs. F. K. Roth, taking a vacation trip along the Monongahela River. The boat now has a black hull, the upper works being white trimmed with buff. The *Patsy* has twin Cooper-Bessemer, each 400 hp.

THE TWO latest additions to the Lake Tankers river oil fleet, the *Charles T. Parker* and the *Fivian Parker* have been re-named—the former is now the *Rapid Cities* and the latter has *Volunteer Cities* on her nameboard. Both are powered with General Motors engines.

All These People Can't Be Wrong!

Use the Merlin Servicemaster to recondition your injector nozzles in less time than it takes to pack and ship them.



Diesel engine manufacturers, shipping companies, railways, transport operators, and government departments use the Servicemaster.

Some United States and Canadian Users of MERLIN

Northam Equipment, Ltd. Montreal	Rodgers Diesel & Engine Co. New Orleans
Diesel and Electric Maintenance & Supply, Ltd. Toronto	John M. Walton, Inc. New Orleans
The Hydro Electric Power Commission of Ontario Toronto	Brown & Root, Inc. Houston
The Ontario Provincial Institute of Trades Toronto	Diesel & Magneto Service Houston
G. & K. Diesel Service Boston	Golden Marine Co., Inc. Brooklyn
Scintilla Magneto Division, Bendix Aviation Corp. Sidney, N.Y.	Toledo, Peoria & Western RR Peoria
A. & D. Diesel Service, Inc. Brooklyn	Chicago, Northwestern RR Chicago
Diesel Injection Sales & Service Norfolk	Baltimore RR Baltimore
Patten Sales Company Jacksonville	Alexander Shipyard New Orleans
Stuart Diesel Service Tampa	Avondale Marineways Avondale, La.

MAIN DISTRIBUTORS IN NORTH AMERICA

BURNETT MACHINERY (CANADA)

168 King Street East

Toronto, Ontario, Canada

Local distributors still required for some areas.

PROBABLY the most popular steamboat ever to run on the upper Mississippi is the *Alexander Mackenzie* built in 1939, owned by the Mississippi Valley Barge Line. But she is now a thing of history, going out of commission to become a landing boat. Tied up at Cincinnati, Ohio, the once proud steamer was completely stripped of all machinery. Other steamers are to give way to the march of diesels, we hear, during the winter months.

COOK Towing Co., Houston, Texas, is very proud of the new tugboat *Warrengas* soon to be completed at the Avondale Yards, New Orleans. This is to be not altogether new construction, the hull being from one of the U. S. Engineer boats. The engine room will have a 1200-hp. General Motors diesel engine. The work outlined for the craft is the year-round delivery of bottle gas from Houston to Florida cities and to Havana, Cuba.

WE HAD a letter from Jerome Norcross of near Pittsburgh suggesting a story on the "southern invasion" of the upper Ohio, the Monongahela, and the Great Kanawha River. He mentioned a number of boats and tugs from the "coast country" describing the *W. C. Harms* of the Harms Towing Co., Houston, Texas, as his favorite. This boat has a General Motors engine rated at around 300 hp.

IT WAS a pleasure to get a good look at the neat little 48 x 14½ x 6 boat called the *Trailblazer* and belonging to Paradise Collieries, Cincinnati, Ohio. She was headed down the Ohio to reopen the coal towing business in Green River. The new boat has 400 hp. from twin Cummins diesel engines.

Receives Top Honors



John W. Holmes

The highest grade received in recent examinations for professional mechanical engineers was attained by John W. Holmes, an engineer for The Cooper-Bessemer Corporation, Mount Vernon, Ohio. The examinations, conducted by the Ohio State Board of Registration for Professional Engineers and Surveyors, were given to 712 applicants. Associated with The Cooper-Bessemer Corporation since 1945, Mr. Holmes attended Harvard University and during World War II came to Kenyon College as an instructor in the Army Air Corps pre-meteorological school. Presently he is in the applied mechanics department responsible for stress and vibration analyses. The Cooper-Bessemer Corporation is noted for dual fuel engines, diesel engines and reciprocating compressors used in refineries, chemical plants and for transmitting natural gas and oil through cross country pipe lines like the "Big Inch" and the Transcontinental Pipe Line from Texas to the East Coast.

YOUR COPY OF DIESEL ENGINE CATALOG in its eighteenth completely re-edited, revised and expanded edition is now off the press. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this latest edition now. Profusely illustrated. \$10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.

BETTER THAN

150,000
MILES



VAPOR BLAST Liquid
Honing

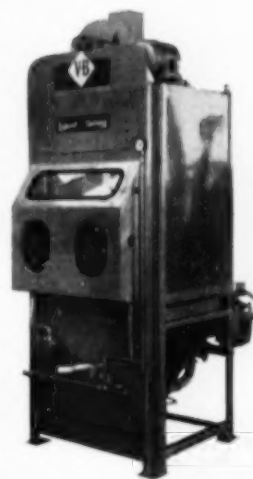
BETWEEN

MAJOR OVERHAULS

Since Using VAPOR BLAST*
LIQUID HONING*

The nation's leading Diesel motor freight carriers are using Vapor Blast Liquid Honing for removing carbon and other foreign material from truck engine blocks, pistons, valves and similar engine parts.

The increase in pulling time mileage is only one of many advantages the Vapor Blast method offers the truck fleet operator. Other cost-saving advantages are these:



Vapor Blast Model 3030

14 Times Faster One big overhaul shop reports cleaning time of pistons reduced from 14 hours required by the old method to about 1 hour with Vapor Blast.

Reduces Break-In Time A striking feature of the Vapor Blast method is that it does not leave cylinder walls, pistons and other working metal surfaces with a high polish. Instead, it creates a dull satin finish to which oil clings. This reduces break-in time and provides lifetime anti-friction protection.

SELF-CONTAINED CABINET

Vapor-Blast machines are available in five standard cabinet models, adaptable to your needs. Illustrated is the Model 3030, Type B-20, which can be set up on about 3 square feet of floor space. The machine is automatic, with its own pump, filters and rinsing equipment. Abrasives range from coarse 20-mesh to fine 5,000-mesh, which is finer than face powder.

Free Demonstration Send us one of your parts to be processed and finished by Vapor Blast Liquid Honing! We'll return it with an accurate laboratory record of processing data for your evaluation.

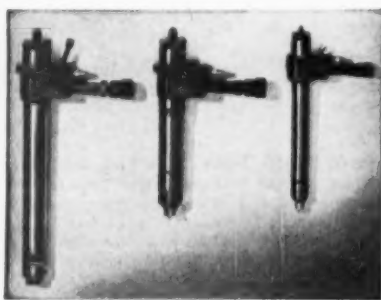
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	3005A W. Atkinson Ave. Milwaukee 16, Wisconsin	
<input type="checkbox"/> Under separate cover we are sending a part for FREE V.B. Liquid Honing demonstration. We expect a complete report with return of part.		
<input type="checkbox"/> Please send details of V.B. Liquid Honing.		
Our Product is _____		
Firm _____		
Address _____		
City _____ State _____		
Attention of _____		

* VAPOR BLAST is a trademark * LIQUID HONING is a trademark

You Can Depend On ADECO



The ADECO Model "P" Single-Unit Fuel Injection Pumps are of the "port-control" type. Simple and rugged in construction and precision built by ADECO craftsmen, these pumps are extremely reliable.



ADECO injectors are available in four sizes and a number of different styles and lengths. The ADECO water-cooled injectors are made in size No. 4 only, and have built a reputation for excellent performance where heavy fuel oils are burned.

When Ordering Fuel Injection Equipment
SPECIFY ADECO!

ADECO PRODUCTS
INCORPORATED

Designers and Manufacturers of Diesel Fuel
Injection Equipment



5435 N. Wolcott Avenue, Chicago 40, Illinois

Vice President



Matthew J. Betley Betley, 37, joined Aeroquip in September, 1952, and was named vice president-manufacturing in February, 1953. In his new post, Mr. Betley will be responsible for sales, engineering, financial, and manufacturing functions of Aeroquip Corporation, including management of three wholly owned subsidiaries; Aeroquip, Inc., Van Wert, Ohio; Aero-Coupling Corporation, Burbank, California; and Elbecco, Inc., Jackson, Michigan.

Mr. Betley attended Ripon College, Ripon, Wisconsin, later doing graduate work at Northwestern University and Armour Institute. Aeroquip is one of the world's leading producers of flexible hose lines for aircraft and industrial applications.

Illustrated Catalog

A 32 page illustrated catalog on all types of Flexon Metal Hose has just been released by Flexonics Corporation, formerly Chicago Metal Hose Corp., Maywood, Illinois.

This catalog covers the full range of the company's manufacture in Rex-Weld corrugated metal hose, Rex-Tube convoluted hose types, Rex-Flex stainless steel flexible metal hose, and numerous special purpose assemblies. Featured is new industrial Rex-Flex heavy duty stainless steel hose. Also covered are coupling types and installation.

For a copy please write Flexonics Corporation, 1325 South Third Avenue, Maywood, Illinois, asking for catalog number 130R.

Green Joins Sales Staff



Roy W. Green

The appointment of Roy W. Green, formerly of the Hoof Governor Company, Chicago, to the sales staff of The Pierce Governor Company, Inc., Anderson, Indiana, was recently announced by L. B. Hakes, vice president-sales, of the Pierce firm. Green assumed his new duties as a special assignment field man. He has a background of more than 14 years with the Hoof Company, primarily in the field of velocity type governors, and had recently carried primary sales engineering responsibility for a new line of centrifugal mechanical governors. The Pierce Governor Company, makers of centrifugal mechanical governors for internal combustion engines is also associated with the aircraft and automotive industry in the manufacture of hydraulic controls.

Here's Why

INSTALLATIONS COST LESS

WITH

Bendix STARTER DRIVES

Yes, it costs less to install a Bendix® Starter Drive, but that's only part of the story. The outstanding efficiency of the Bendix Drive has been performance proven in over 85,000,000 installations. No other starter drive approaches this record. Whatever your type of diesel, or whatever its purpose, for more dependable all-around performance it pays to specify Bendix Starter Drive.

REG. U.S. PAT. OFF.

CHECK and COMPARE THESE FEATURES

- Starting motor can be mounted more easily and in more positions.
- Requires no actuating linkage—solenoid can be placed in any convenient position.
- Simple in design—has fewer parts—needs fewer adjustments.

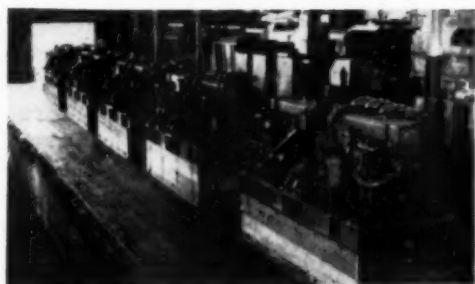


ECLIPSE MACHINE DIVISION of **Bendix**
ELMIRA, NEW YORK

Export Sales: Bendix International Division, 205 East 42nd St., New York 17, N. Y.

DIESEL PROGRESS

Tandem-Twin Diesels



Ready for shipment at the factory in Detroit are five of Detroit Diesel's now "6-110" 530 HP Tandem-Twin diesels. Comparatively small for their power output these engines are 145-in. long, 48½-in. wide at the base and 68½-in. high. Weight is 20 pounds per horsepower for a total of 11,000 pounds. First production model was installed in an 80-foot tow boat recently at West Haven, Connecticut. The engines shown here are going to Stewart & Stevenson, Inc., Houston, Texas, Johnson & Towers, Inc., Philadelphia, Pennsylvania, West Coast Engine & Equipment Company, Berkeley, California, and West Haven Shipyards of West Haven, Connecticut, GM Diesel Distributors to fill customers' orders.

New York District Manager



F. Q. Wilson

F. Q. Wilson has been appointed New York district manager of the Elliott Company with offices located at 271 Church Street. Mr. Wilson, a native of San Jose, California, has been with the company since 1938 and has served as a field engineer in their Kansas City and Tulsa offices. In 1945 he was named district manager of the Tulsa office and in 1947 became district manager of the Cincinnati office.

Federal-Mogul Acquires Bearings Co.

Approval for Federal-Mogul Corporation, Detroit, Michigan, to acquire the property, assets and business of the Bearings Company of America, Lancaster, Pennsylvania, was voted last month at special stockholders' meetings of both companies. G. S. Peppiatt, Federal-Mogul president, announced. The official date of the transfer of assets was December 31, 1953.

"These actions will consolidate two of the oldest bearings companies in America," Mr. Peppiatt stated, "and will make it possible for Federal-Mogul to offer its service customers a complete line of anti-friction bearings, consisting of thrust and ball bearings, and tapered and straight roller bearings, as well as its line of sleeve bearings, thrust washers, and bushings."

Initially, Bearings Company of America will be operated as a division of Federal-Mogul with its service division immediately coordinated with that of Federal-Mogul. J. W. Brady, Bearings Company of America president, was elected a director and vice president of Federal-Mogul effective January

1, 1954. He will be in charge of the new division. The business of Bearings Company of America is the manufacture and sale of three major types of ball bearings, namely, radial bearings, angular contact bearings, and thrust bearings. Bearings Company of America manufactures such bearings in a large number of sizes.

Federal-Mogul has a distribution system of 75 branches throughout the United States and Canada into which the line of Bearings Company of America thrust and ball bearings will fit naturally. Federal-Mogul has about 8,000 original equipment and service market customers in many fields who are prospects for the Bearings Company of America line. At the same time Federal-Mogul will also sell

its regular products to the broad list of additional Bearings Company of America customers. Bearings Company of America is one of the country's oldest and most experienced ball bearings companies with its operations dating back to 1897. It has a long standing reputation for quality products. Its line is particularly applicable to the important automotive and farm implement business in which both it and Federal-Mogul have many customers.

YOUR COPY OF DIESEL ENGINE CATALOG in its eighteenth completely re-edited, revised and expanded edition is now off the press. An invaluable aid to design engineers and buyers, it incorporates the latest diesel engine specifications and descriptions. Order your copy of this latest edition now. Profusely illustrated. \$10.00. Mail checks to DIESEL PROGRESS, 816 North La Cienega Blvd., Los Angeles 46, California.

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STANDARD AND OPTIONAL EQUIPMENT ON

AMERICA'S LEADING DIESEL TRUCKS

TRACTORS AND STATIONARY ENGINES

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and Remember!

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LUBER-FINER

PACKS

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● REDUCE ENGINE WEAR AND MAINTENANCE COSTS

● CLEAN MORE OIL FASTER ● KEEP OIL CLEAN LONGER

FAR BEYOND THAT OF ANY ELEMENT AT ANY PRICE

Luber-finer Packs Available:

REFINING PACK. For use on straight Mineral Oil, Synthetic Oils, Diesel Fuel Oil, Hydraulic Fluids, etc.

DIESELPACK. Expressly designed and recommended for use with all detergent type compounded oils.

WRITE TODAY for complete information—see how you, too, can save many dollars and hours in maintenance.

GET THE FACTS FREE!

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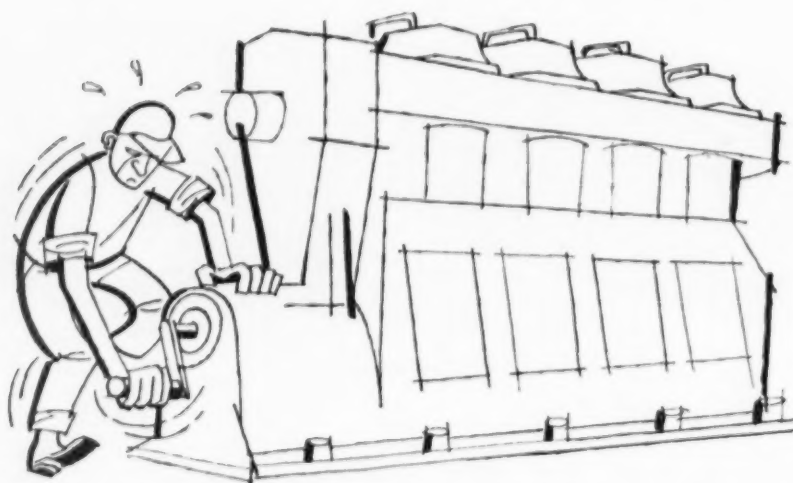
Euclid Sales Appointments



V. L. Snow

The Euclid Road Machinery Company, subsidiary of General Motors Corporation, announces the following promotions in the sales organization. V. L. Snow, formerly manager, domestic sales has been promoted to the position of director of sales. E. F. Armington who has guided Euclid's sales activities for 22 years is resigning from active service but will continue to serve as sales consultant. Mr. Snow, manager, domestic sales

since 1949 has been a member of the Euclid organization since 1935 in various sales, sales development and engineering management capacities. His new duties include directing all functions of domestic, export and government sales, and the sales development and customer service departments. J. E. Ehler has been named manager, domestic sales to fill the vacancy left by Snow's promotion. During the past eight years with Euclid, his experience covers assignments in the engineering and sales development departments, district sales manager, service manager and assistant sales manager. P. H. Malenchini, manager, export sales and R. W. Phillips, manager, defense requirements will continue to direct the activities of those departments.



GET STARTED WITH AIR!

Fed up with the set-up? Give us the details. We will help you select from a variety of compressors, with sizes from 1 to 90 CFM.

Quincy Compressors are designed and built for *dependable operation*. When you select Quincy, you can be sure of compressed air when you need it.



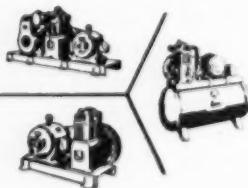
Write Dept. K-34 for Form 400 describing modern . . . compact . . . rugged . . . and reliable Quincy Compressors.



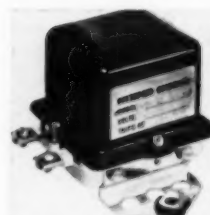
YOU CAN DEPEND ON Quincy COMPRESSORS

QUINCY COMPRESSOR CO.
QUINCY, ILLINOIS

Branch Offices: New York • Philadelphia • Detroit • Chicago
Minneapolis • St. Louis • Dallas • San Francisco
Manufacturers of Air Compressors Exclusively

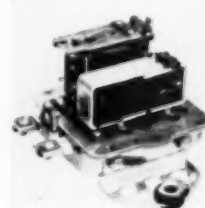


All-Electric Frequency Governors



Governor assembled.

This all electric governor requires no mechanical connections to the engine or device to be controlled. It can be mounted at any convenient place in any position and requires a mounting space less than six inches square. The industrial model weighs less than two pounds and the aircraft type only eleven ounces. They can be furnished to take their frequency reference from an ac. alternator, either 60 or 400 cycles; from a small tachometer generator; or from the ignition breaker points on a gasoline engine. The frequency sensor consists of a tuned vibrating reed driven by an electric magnet connected to the frequency reference. When this frequency reference resonates with the fundamental mechanical frequency of the reed, the latter vibrates and closes contacts to pull in a control relay. The energy required for operation of the reed is less than one watt and the resonate frequency can be calibrated to one percent.



With cover removed.

Standard models are furnished with single pole double throw contacts to open a circuit or close it as required at the preset frequency point and can be procured for either automatic or manual reset. Industrial models are sealed against dust and splash, but where required for explosion proof or aircraft use they are obtainable in hermetically sealed cans. Applications include engine overspeed protection, over frequency cut off on generator sets, alarm lights for over and under frequency conditions, automatic synchronizing, sequence control for turbo starting, circuit breaker or transfer switch operation at exact frequency, etc. They are not affected by vibration, shock, humidity, or altitude. As there are no moving parts except at instant of operation they will outlive the device they are protecting. For complete information write to Custom Built Controls, Electro Governor Division, 1801 Rand Road, Des Plaines, Illinois.

Sales Representative

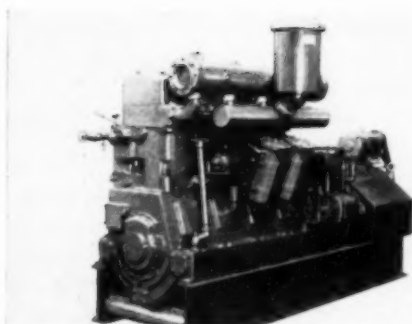
T. A. LeBrecque, vice-president of the Hilco Oil Reclaimer Division, The Hilliard Corporation, has announced the appointment of a new sales representative in the Philadelphia area: Lloyd and Arms, Inc., Philadelphia, will handle sales and service for the Hilco oil purifiers, reclaimers and filters.

Testing Machine Bulletin

The new Baldwin-Emery SR-4 Universal testing machine of 50,000 lb. capacity is described in a new 8 page, illustrated Bulletin 4206 by Baldwin-Lima-Hamilton Corporation, Philadelphia 42, Pa. Novel weighing system, construction, and automatic operation, as well as an unusual multiplicity of uses are presented.

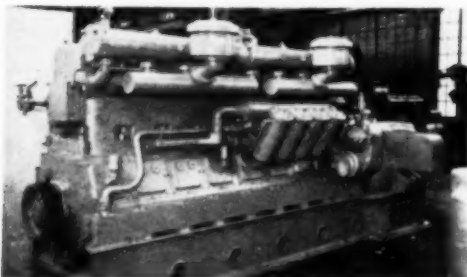
FULL FLOW FILTRATION AT WORK

Five Examples of Full-Flow Filtration Applications



Close up of the naturally aspirated four-cylinder Model 45 with the generator.

View of the naturally aspirated 8-cylinder Model 45 with generator.

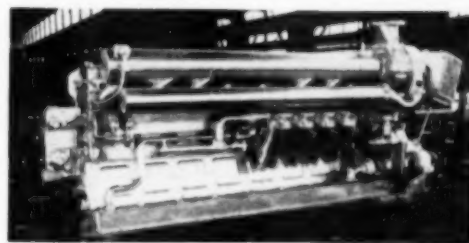
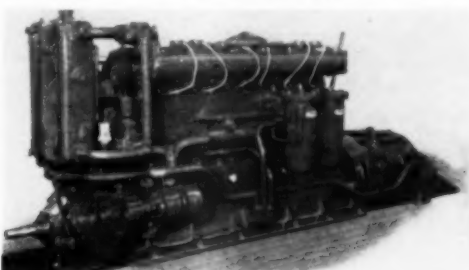


The popularity of full-flow filtration on the lube lines is such that practically all installations are now made following this pattern.

Here we are illustrating five different types of Superior Atlas diesels on all models of which the Winslow full-flow filter is standard equipment.

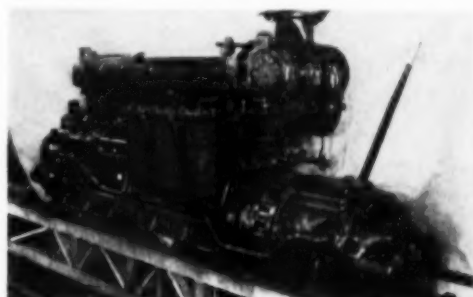
In addition to the Superior Atlas diesel line which is standardized on Winslow full-flow filters, they are also standard on the National Atlas spark-ignited gas engines Model 825 in both 6 and 8 cylinder units and Model 44G-6.

The Model 35 naturally aspirated marine engine with reverse and reduction gear.



The turbocharged 8-cylinder Model 45 engine for 65 foot harbor tug program.

Exhaust side of the 6-cylinder supercharged Model 35. Note the three Winslows on the supercharged 35, two on the naturally aspirated and one on the 4-cylinder engine.



ANOTHER GREAT PRODUCT DEVELOPED BY KIENE

new

KIENE

hydraulic

test pump

new

**revolutionary
design . . .
made expressly
for field service**



CONNECTOR SET KIT

makes convenient connection of test pump to most popular makes and models of diesel engines. Fixtures for testing Cummins and General Motors engines available.

**CORROSION-PROOF MECHANISM.
LIGHT WEIGHT ALUMINUM CASE.
HEAVY DUTY HYDRAULIC GAUGE —
EASILY INTERCHANGEABLE —
SWIVELS 360° ON TWO PLANES.
LARGE FUEL CAPACITY—10 MICRONS
PRECISION FILTERS—KIENE PATENTED
DIAPHRAM TYPE VALVES.
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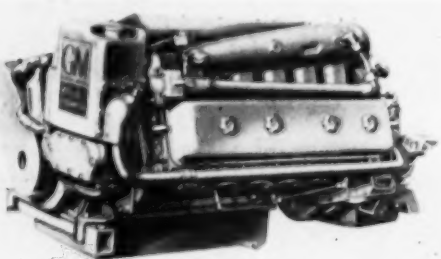
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Detroit Diesel's Display at Show

Diesel engines on exhibit at the 1954 New York Motor Boat Show, January 15 to 25, reflect the advances which today have increased the potential use of diesel propulsion in boats from 24 ft. to 150 ft. in length. Responsible for this increased potential are the reductions in size, weight and height accomplished within the last decade and the new models introduced by various manufacturers even since last year's show.



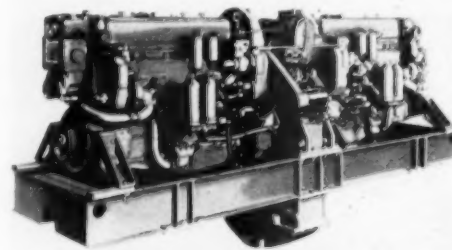
The GM Model 6-71 inclined propulsion unit delivers 216 shp. at 2100 rpm. or 146 continuous shp. at 1800 rpm.

Contributing to this trend the Detroit Diesel Engine Division of General Motors alone during the year just ended added five new diesel models to its line of marine propulsion engines. Displayed in this year's show for the first time on the East Coast, Detroit Diesel has a new inclined six-cylinder engine of the "71" series and a new 12-cylinder tandem-twin unit of the "100" series. With these new engines the Division has a varied line of pleasure and work boat diesels ranging from 54 to 684 horsepower. Also ready for introduction is a new two-cylinder valveless diesel of the "51" series for use as an auxiliary power unit. The Division's new inclined six, like its companion the inclined four-cylinder "71," has block and head tipped on its side to attain an overall height of less than 33 inches. It puts a smooth 216 horsepower aboard a pleasure boat and conforms to the new sleek lines now in vogue in pleasure craft design. By extensive use of aluminum alloys throughout the engine a weight of only 10.5 pounds per horsepower has been attained. A matched pair of these engines installed in a realistic hull section are on display in the Division's exhibit.

The new tandem-twin unit consists of two of Detroit Diesel's 6-110 marine engines mounted end-

to-end to drive a single propeller shaft. It has an intermittent rating of 530 shp. for large pleasure boats and produces 409 continuous shp. for work boats. It is 68 inches in height and weighs less than 21 pounds per horsepower including its gear box and structural steel base. The tandem arrangement of the engines provides a unit that is easy to service even in relatively small engine rooms.

A four-cylinder valveless marine diesel of the "51" series for pleasure and work boats of 24 feet and up in length is shown in the Detroit Diesel section. The weight of this engine as it was introduced in last year's show was 1400 pounds. Today, due to a new and lighter flywheel and flywheel housing its weight has been reduced almost 10 per cent. Also on display is a new motorized cutaway model of the three-cylinder Series "71" engine which does practically everything but talk in demonstrating the internal workings of the General Motors two-cycle diesel engine.



The GM Model 6-110 tandem-twin propulsion engine. It develops 530 shp. at 1800 rpm. or a continuous heavy duty shp. of 409 at 1600 rpm.

Manning the Detroit Diesel exhibit are R. W. Phillips, marine sales manager, Eric Sutton, assistant marine sales manager, engineering, field and other representatives of the factory. Also on hand are representatives of Detroit Diesel's East Coast marine distributors. W. T. Crowe, general manager, E. F. Bentley, general sales manager and L. S. Sheldrick, director of engineering of the Division will also attend.

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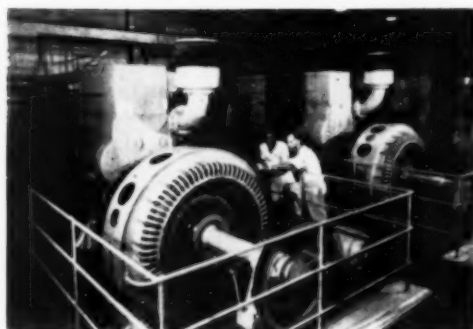
Winslow Appoints Towner



V. L. Towner

The V. L. Towner Co. has been appointed industrial sales representative for the Cleveland district according to a statement by Carlton H. Winslow, vice president of sales, Cuno Engineering Corp. The Cleveland territory includes northern Ohio. Mr. Towner is a graduate of Bucknell University with a BS degree in Commerce and Engineering. He served as a Lt. Commander in the Naval Air Force during the war then joined the Socony-Vacuum Oil Company sales force in the Pittsburgh area. Since 1948, he has served as assistant general manager of The George P. Dempster Company in Pittsburgh, selling Cuno industrial filters and related products.

Another Diesel for Liberia

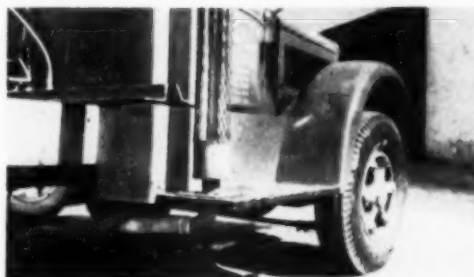


View of the Monrovia, Liberia plant showing the two Superior engines. Note Burgess-Manning silencers.

The National Supply Company, Engine Division, Springfield, Ohio, has been awarded the contract to furnish a Model 65-SX-8, 8-cylinder, Superior diesel rated 1765 bhp at 600 rpm for the Krutown power plant of Monrovia Port Management Co., Ltd., in Monrovia, Liberia, West Africa. The new turbocharged engine at Krutown will drive a 1250-kw, 3-phase, 60-cycle, 3-wire, 2400-volt generator, bringing the plant capacity up to 2450 kilowatts. Designed for heavy-duty service, the Model 65 is available naturally aspirated or supercharged, and can be fitted with dual-fuel equipment where gas fuel is available.

Selection of the new Superior for this plant is directly attributable to the performance of three Model 60, 625-bhp units purchased in 1950. Monrovia Port Management Co., Ltd., is a corporation set up to manage and supply municipal services to the city and port of Monrovia.

Heavy Duty Automotive Flexible Tubing



New Flexon Heavy Duty Automotive Tubing (RT-8), installed as part of diesel exhaust system. The tubing, of heavy-weight galvanized steel up to .022 in. thick, was designed by Flexonics Corporation to withstand vibration and corrosive agents encountered in big truck, tractor and diesel operation.

In answer to demand for an exhaust system that will stand up under heavy duty operating conditions on diesel trucks and tractors, Flexonics Corporation has developed a new galvanized, interlocked flexible tubing that is heavier than ordinary automotive tubing and highly resistant to corrosion. The new product, called Flexon Heavy Duty Automotive Tubing, and designated as RT-8 in the company's catalog, comes in 16 standard diameters ranging from 1 in. to 8 in., inside. Intermediate and larger sizes are available on order. Construction is of convoluted galvanized steel, similar to the lighter-weight RT-6 flexible metal tubing produced by Flexonics for automotive uses since the early 1920's. However, RT-8, designed specially for truck, tractor and diesel applications, is made of heavier gauge metal up to .022 in. thick.

Wherever tested in service on truck fleets and elsewhere, the new heavy duty tubing has successfully withstood vibration and corrosion in such tough spots as diesel tail pipes, diesel exhaust pipes, and truck and tractor exhaust hoses. For further information, write Flexonics Corporation, Maywood, Ill.

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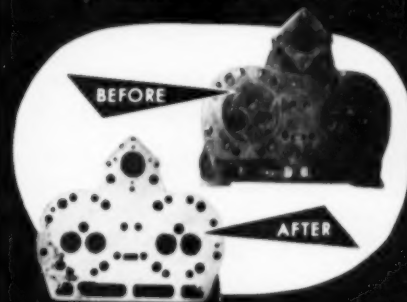
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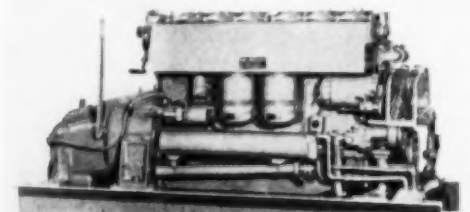
"Thunderbird"



The *Thunderbird*, a converted army rescue vessel during her trial runs at Jacksonville, Fla. before undertaking her new role as a shrimp trawler.

The *Thunderbird*, converted from a former army rescue boat, is giving a good account of herself around the Campeche, Mexico shrimping grounds, according to her owner, George McRae of Fernandina, Florida.

The job of converting her to a shrimp trawler was handled by the Jacksonville Yacht Storage Co. of Jacksonville, Florida, distributors of Murphy diesels in North Florida. The *Thunderbird*, measuring 104x19 feet, is quite a bit larger than the average shrimp trawler but handles very well on a trawl. It has both 32 volt and 110 volt electrical systems permitting the use of hot water heaters, refrigerator and a deep freeze for the crew's food. The 32 volt system handles the engine starters, radio-telephone, etc., and other instruments.



One of the model M190 Murphy diesel engines with Snow Nabstedt 2:1 reverse and reduction gears before installation in the twin screw shrimp trawler *Thunderbird*.

It was originally a triple screw job but in the conversion the center engine was eliminated. Jacksonville Yacht Storage Co. installed new twin rudders and new steel engine beds for the two model M 190 Murphy diesel engines rated at 190 hp. each at 1200 rpm. with 2:1 Snow Nabstedt reverse and reduction gears. Engine accessories were a 1500 watt Delco Remy battery charging generator. Twin

Disc 20 hp. 1:1 power take-off and Westinghouse air reversing controls. The ice compartment was insulated with Styrofoam and is so constructed that a possible change to quick freezing can be made at a later date. Jack Craig of Jacksonville Yacht Storage Co. who has introduced Murphy diesel engines to the Florida shrimp fleet owners, believes that the longer runs to Campeche and Central America need larger vessels with more diesel horsepower.

Admiral Smiley Joins Engine Company



Curtis S. Smiley, Rear Admiral, U.S.N. (Ret.)

Robert Russell, president, Sterling Engine Company, Buffalo, N. Y., manufacturers of Sterling Diesel engines and generator sets, today announced that Admiral Curtis S. Smiley has been appointed to the executive staff as assistant to the president. Admiral Smiley just recently retired after 30 years' service in the U. S. Navy. Upon graduation from Annapolis in June 1923, the then Ensign Smiley reported for flight training at the Pensacola, Florida, Naval Air Station. The outbreak of World War II found him in command of Air Group Five, assigned to the Carrier *Yorktown*. He was awarded the Distinguished Flying Cross for action in the first Marshall-Gilbert Islands strike in January 1942 and the Commendation Ribbon for the Salamana-Lae strike in March 1942. As commander of the escort carrier *USS Rudyerd Bay*, he was awarded the Bronze Star Medal for South Pacific campaigns. At the time of his retirement Admiral Smiley was Chief of Staff, Commander, Eastern Sea Frontier Headquarters, New York City. His business address will be the general offices of the Sterling Engine Company, Buffalo, N. Y.

Northern California Representative

Farr Company, Los Angeles manufacturers of air filtration equipment, announces the appointment of Air Filter Sales & Service Co., Inc., San Francisco, as its sales and service representative for Northern California. Air Filter Sales & Service Co., Inc., has been a Farr-Air distributor for the past 5 years, according to J. D. McCampbell, Farr sales manager.

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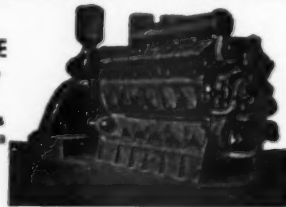
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Gulf Coast News

By Michael T. Pate

TROPICAL Steamship Company, Ltd., Toronto, Ontario, Canada, operator of the S.S. *Carl Schmedeman*, purchased through Stewart & Stevenson Services, of Houston, a General Motors Series 71, Model 24103 Quad 6 diesel which is being installed in the vessel by Todd Shipbuilding Company, of Galveston. The diesel, driving a 400 kw. ac. generator, replaces a steam turbine unit for general auxiliary power aboard the ship.

HUNT Lumber Company, Willis, Texas, has bought from Whites, Inc., of Houston, a Model UD-18 International Harvester diesel delivering 125 hp. at 1600 rpm. The diesel is installed at one end of the line shaft powering the company's sawmill, with a 125-hp. steam engine at the other end to carry part of the load. The diesel was bought to supplement the original steam power unit.

TEXAS Iron Works, Houston, has bought from Mustang Tractor & Equipment Company, Houston, two Caterpillar Model D-315 electric generator sets, each driven by a diesel operating at 1200 rpm. and delivering 27 kw. constant load at 220 volts. Both units are to be used on an oilfield utility unit.

GEORGE Engine Company, Harvey, Louisiana, has bought from Stewart & Stevenson Services, Inc., two Stewart & Stevenson Model 2MD-20 generator sets. Each set is powered by a General Motors Series 71, Model 2061-A diesel delivering 43 hp. at 1600. Both sets are for use on a marine installation.

K. SAIBARA, Webster, Texas, has bought from Houston Power Equipment Company, Houston, an International Harvester diesel tractor, Model TD-14, developing 66 drawbar horsepower. The tractor will be used in general maintenance work on the owner's agricultural development, including the construction of irrigation and drainage canals.

CLEGG & Hunt Drilling Company, Houston, are repowering a Unitrig drilling setup complete with Murphy diesels, purchased through Houston Engine & Pump Company, Houston. Three Murphy diesels, Model 124, and delivering 210 hp. each at 1200 rpm. and two Model 24 Murphys, each rated at 185 hp. at 1200 rpm. will power the rig and mud-pump assembly.

GILLETTE Motor Freight Lines, Dallas, has had installed in two L-190 semi-trailer trucks Model DAS-516 Buda diesels, rated at 165 hp. at 2400 rpm. Sales and installation were made by Buda Engine & Equipment Company, of Dallas.

A. F. JAMAIL & Son, Houston produce firm, has dieselized another of their road trucks by having Cummins Sales & Service, Inc., of Houston, replace the original power plant with a Cummins diesel, rated at 150 hp. at 2500 rpm.

LEVINGSTON Shipbuilding Corp., Orange, Tex., is installing in a petroleum barge the firm is building for Magnolia Petroleum Company three Stewart & Stevenson Model 110-GD 100 generator sets, each powered by a 110 series, model 62401 General Motors diesel. These units will furnish power for the barge. Two General Motors series 70, Model 2061-A diesels, each rated at 43 hp., will power two centrifugal pumps on the same barge.

CLARENCE Aldrich, Crosby, Texas, has bought through Houston Power Equipment Company, Houston, an International Harvester diesel tractor, model WDR-9, delivering 58 hp. at the drawbar, for general agricultural work.

ELLERBEE Brothers, Port Arthur, Texas, have bought a General Motors series 110, model 62401, diesel, delivering 285 hp. at 1800 rpm. The diesel will drive a Stewart & Stevenson model 110-GD 100 generator set to power eight 400-ampere electric motor driven arc welders.

R. H. FULTON & Company, Lubbock, Texas, have secured three more dieselized ac. welding generators for the work now in progress on pipelines in New Mexico. The units were secured through Big 3 Welding Equipment Company, Houston.

O. D. LANKFORD Lumber Company, Lufkin, Texas, has secured through Whites, Inc., of Houston, a model UD-18A International Harvester diesel rated at 125 hp. at 1600 rpm. The diesel will replace former power unit on a portable sawmill.

T. A. LONG, Dayton, Texas, has bought from Houston Power Equipment Company, Houston, a model WDR-9 International Harvester diesel tractor, for service in nearby fields.

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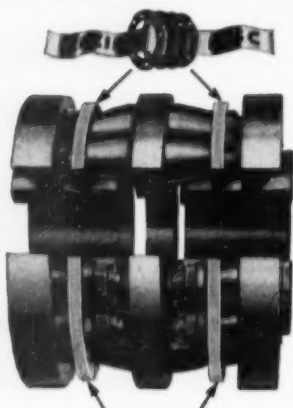
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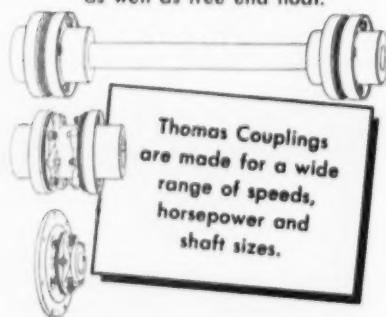


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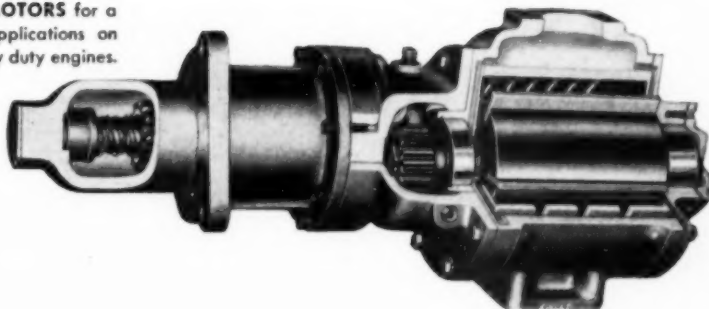


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By far the largest dragline ever used in Alabama, the new "H. T. DeBardeleben" (shown here), is now stripping rock, sand and shale at a rate of 600 cubic yards an hour in double truckload bites. And like so many big draglines everywhere, it has the money-saving advantage of a husky, smooth-running, long-lived Cooper-Bessemer.

But check up on *all* the factors that determine the efficiency, behavior and cost of power. You'll come up with the reasons why Cooper-Bessemers are favored engines in this and all other kinds of heavy-duty service.

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